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CARCINOMA OF THE ESOPHAGUS

By PHILIP THOREK, M.D., F.A.C.S.

CARCINOMA of the esophagus is no longer considered an inoperable lesion. Operative procedures which aim at both a permanent cure or a prolongation of life have been standardized. Many surgeons including F. Torek[1], Sauerbruch[2], Fischer[3], Ochsner and DeBakey[4], Adams and Phemister[5], Garlock[6], Carter, Stevenson and Abbot[7], Jonas[8], Marshall[9], Cattell[10], and Churchill and Sweet[11], have successfully resected malignant lesions involving both the esophagus and the cardiac end of the stomach.

In 1895, Rehn[12] was the first to mobilize the human esophagus extrapleurally. Faure[13] in 1903, extirpated a carcinoma of the esophagus extrapleurally on two patients; both of these died. In 1907, Wendel[14] resected the lower end of the esophagus and re-established the continuity of the alimentary tract by devising a lateral anastomosis with a Murphy button. Torek[1] performed the first successful resection of the thoracic esophagus for carcinoma in 1913; his patient survived for eleven years without evidence of recurrence. In this operation Torek brought the upper end of the esophagus out into the neck and restored continuity by means of a rubber tube which connected with a gastrostomy. Numerous other attempts have been made, but these procedures have given poor results and a high mortality for the following four reasons:

1. Inaccessability of the esophagus.
2. Lack of a serous coat surrounding the esophagus.
3. Fear of entering the pleural cavity.
4. Working in an area where infection spreads rapidly and is especially dangerous.

It is only during recent years that surgeons have renewed their attack upon this problem, and this has resulted in a greater percentage of success and promise for the future. This report covers an experience with 50 cases from which impressions have been gathered regarding the surgical management of esophageal carcinomas.

Of the 50 cases seen during the period extending from January 1946 to January 1949, there were 22, or 44 per cent, which were found to have tumors that could not be removed. In the remaining 28, or 56 per cent, radical resection, followed by intrathoracic esophagogastric or esophagojejunal anastomoses, was performed. In 22 cases it was impossible to extirpate the lesion due to extensive local fixation and invasion of important structures, such as the aorta, pulmonary vein or bronchus. In the 28 patients who had an esophagectomy performed, 7 died due to cardiopulmonary complications, and the 21 who are alive are improving clinically at the present writing. In the group which had resections performed, 19 cases had lesions in the lower esophagus and cardiac end of the stomach (Zone 3), and in 9 the malignancy was found in the midthoracic region (Zone 2). It is interesting to note that of the 50 cases operated upon, 36 patients were over 65 years of age, and the remaining 14 were between 45 and 50 years of age.

Churchill and Sweet[11] have divided the esophagus into fourths rather than the classical division into thirds. Their second and third fourths constitute the middle section of the esophagus. By means of this division it is possible to consider the esophagus as having three zones. Zone 1 extends from the base of the neck to the superior aspect of the aortic arch. Zone 2 includes the middle portion which extends from just above the aortic arch to a point just below the level of the inferior pulmonary vein. Zone 3 is the lower fourth of the thoracic esophagus, the cardiac orifice of the stomach and just a few centimeters of stomach including the fundus. Making use of these zones, we have tried to standardize a given procedure or procedures for each zone.

Zone 1 affords the greatest technical difficulties; fortunately this is an uncommon location for carcinoma. Lesions of this part of the esophagus present a specialized problem and the operative procedures are still being perfected. Sweet[15] has standardized the surgical treatment for carcinoma of the midthoracic esophagus (Zone 2); he does a resection with high intrathoracic esophagogastric anastomosis. For lesions involving Zone 3 as well as the cardiac portion of the stomach, a combined thoracico-abdominal approach as described by Garlock[16] is most applicable.

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Treatment of Zone 2 Lesions

It is in lesions which involve this zone, or the middle half of the esophagus, that the operative procedure described by Sweet[15] is best utilized. This is essentially a partial esophagectomy and partial gastrectomy followed by a supra-aortic intrathoracic esophagogastrostomy.

Case Report

The following case is a typical example of a patient with a Zone 2 lesion:

The patient, J. B., a 66 year old white male, entered the hospital on April 14, 1947, stating that he had pain beneath the middle of the sternum following each meal; this complaint started in August 1946. In February of 1947 he complained of difficulty in swallowing solid foods. Regurgitation and vomiting were present and in the last three months he lost 18 pounds. At present he was only able to swallow liquids. Temperature, pulse and respirations were normal and blood pressure was 144/80. Physical examination was essentially normal. X-ray examination revealed a filling defect and definite narrowing about the midthoracic esophagus. The patent was esophagoscoped and the biopsy revealed a squamous cell carcinoma. On April 23, 1947, the patient was operated upon and a partial esophagectomy with a supra-aortic esophagogastric anastomosis was performed. The pathologist reported a hornifying squamous cell carcinoma of the midthoracic portion of the esophagus. With the exception of a rise in temperature of 102° on the second postoperative day, this patient's postoperative course was quite uneventful. Postoperative chest x-rays revealed some exudative fibrous pleuritis of the left hemithorax. Some slight dyspnea was present, but the breath sounds were heard. Patient was out of bed on the fourth postoperative day.

Treatment:

It must be emphasized that no surgeon can be expected to do this type of surgery without the aid of a competent anesthetist. By competent anesthetist we mean one who not only can give a perfect intratracheal positive pressure anesthesia, but who also is versed in the minutia of pre- and postoperative care. Ample blood and plasma are provided.

The patient is placed on his right side with the left arm held forward and the left side of the chest arched upward. The incision begins at the left costal margin anteriorly, extends backward usually over the seventh or eighth rib, and ends by extending upward between the spinal column and the left scapula (Fig. 1-A). A wide resection of the rib is accomplished by cutting its cartilage anteriorly and its neck posteriorly. To obtain proper exposure, it is usually necessary to divide the seventh, sixth and fifth ribs posteriorly and at times the ninth rib. These ribs are either severed or small sections are removed; however, we have found that removal of a small segment produces less postoperative pain. The left thoracic cavity is entered, a rib spreader inserted and the field completely exposed. The inferior pulmonary ligament and mediastinal pleura are incised, and resectability of the growth determined. Extensive involvement of the left main bronchus, aortic arch or inferior pulmonary vein usually signify an inoperable condition. Dissection is begun anterior to the esophagus, and if these three structures can be safely avoided, the posterior dissection is started. After freeing the esophagus anteriorly and posteriorly the growth is freed from the right mediastinal pleura. At times it may become necessary to remove a portion of this layer, which results in an opening into the right thoracic cavity. The surgeon relies upon the skill of the anesthetist and the closed system by means of which he can exert positive pressure and prevent or re-expand a collapsed right lung. Sweet[15] states that in 32 cases the right pleural cavity was entered 13 times. No attempt is made to close such a defect, because after the left lung has been expanded and the chest closed no ill effects have resulted. At this point in the dissection the esophagus has been mobilized from the aortic arch downward to the diaphragm. The abdomen is then entered through an incision in the diaphragm which extends radially from the esophageal hiatus to the costal margin (Fig. 1-B). The branches of the phrenic artery which supply the diaphragm are usually quite large and bleed profusely, hence they are individually severed and ligated. The upper two-thirds or three-fourths of the stomach is mobilized by dividing the gastrosplenic ligament and severing and ligating the vasa brevia and left gastro-epiploic vessels. The gastrocolic ligament is divided as far as the pylorus; the right gastro-epiploic vessels are spared. The lesser curvature of the stomach and the lower end of the esophagus are mobilized by division of suprarenal, phrenic and pericardiophrenic vessels. The left gastric artery can now be easily identified, cut and tied close to its origin near the

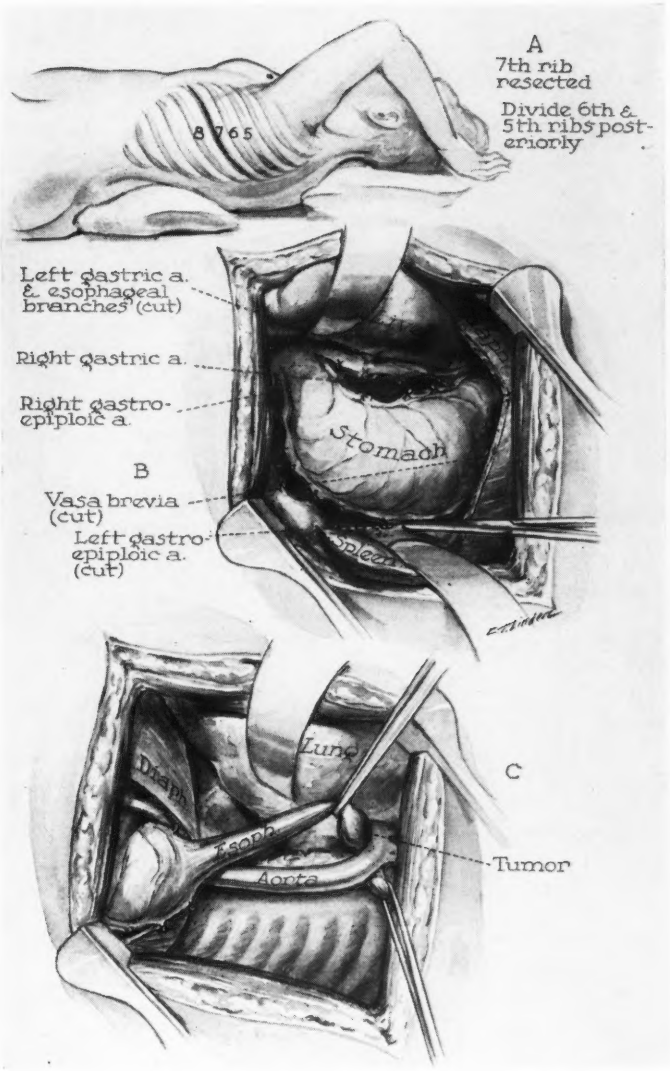

Fig. 1. Surgical Treatment for Carcinoma of the Midthoracic Esophagus (Zone 2)

(A). The patient is placed on his right side with the left arm held forward and the left side of the chest arched upward. The incision begins at the left costal margin anteriorly, extends backward usually over the seventh rib, and ends by extending upward between the spinal column and the left scapula. A wide resection of the rib is accomplished by cutting its cartilage anteriorly and its neck posteriorly.

(B). The diaphragm has been divided and the lower end of the esophagus and greater part of the stomach mobilized.

(C). The tumor and the esophagus are freed both above and below the arch of the aorta.

celiac axis (Fig. 1-B). This extensive mobilization permits the fundus of the stomach to be placed into the apex of the chest with ease.

The stomach is divided distal to the cardia; the distal portion is inverted by means of a two-layer closure, the first layer is usually a continuous catgut suture and the second interrupted cotton. Heavy crochet cotton placed around a piece of gauze closes the lower end of the esophagus.

The dissection is next carried above the aortic arch. An incision is made in the mediastinal pleura above the arch, and that part of the esophagus which lies in the superior mediastinum is freed. The attachments of the esophagus behind the arch are completely freed by dividing small arteries which arise from the aorta and some additional branches which arise from the bronchial arteries. When the esophagus is properly mobilized, it becomes possible to pull it up from behind the aortic arch, turn it outward and perform an esophagogastric anastomosis (Fig. 2-A).

An outer layer of interrupted cotton sutures is placed which approximates the muscular coat of the esophagus to the serosa of the stomach. Because of the lack of serosa on the esophagus and

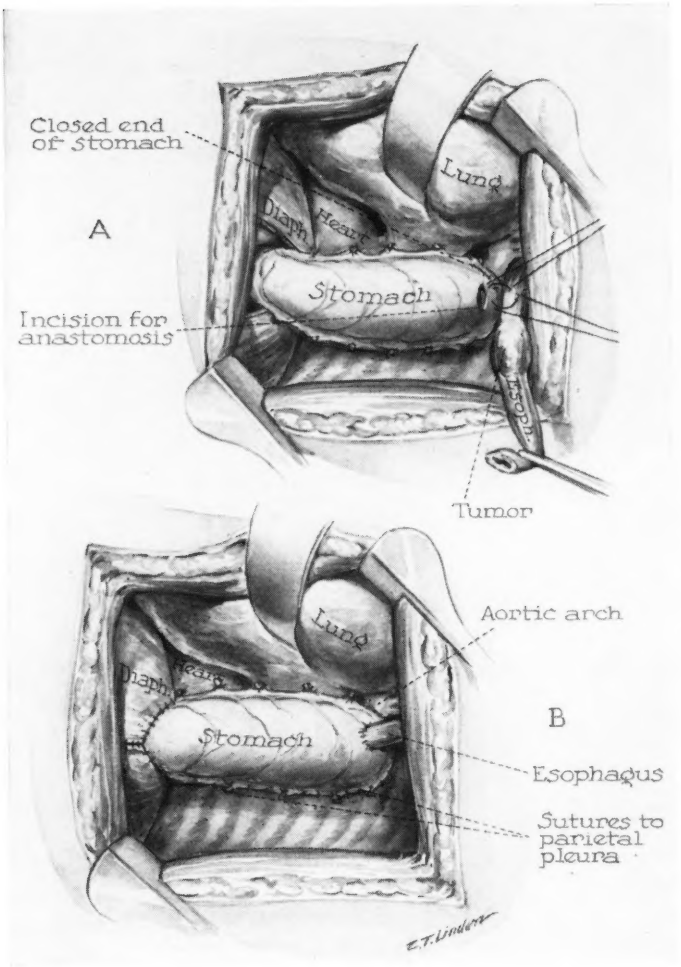

Fig. 2. Surgical Treatment for Carcinoma of the Midthoracic Esophagus (Zone 2) (Cont'd.)

(A). The stomach has been divided distal to the cardia and the gastric opening closed by two layers of sutures. The freed esophagus is brought over the arch of the aorta. The muscularis of the esophagus is approximated to the serosa of the stomach. An opening is made high on the gastric fundus. The tumor and major portion of the esophagus are removed and the anastomosis completed.

(B). The diaphragm is repaired. To relieve tension upon the suture line, the stomach is sutured to the parietal pleura and the edges of the diaphragm are fastened to the gastric antrum.

its longitudinally placed musculature, it is best to use a mattress type of stitch. An opening is made high on the fundus of the stomach, and the posterior esophageal wall is incised. The edges of the stomach and esophagus are sutured by means of through and through interrupted cotton sutures. The tumor and major portion of the esophagus are removed. A Levine tube is passed from the nose through the esophagus, over the suture line and into the stomach. Two anterior suture lines are now placed over the tube: an anterior through and through and an anterior musculoserous. Some surgeons object to placing a tube over a suture line especially where the blood supply is poor. We have never hesitated to employ such a tube in our esophageal work, and have used it as well in anastomoses which involve the distal sigmoid and rectum even after severing the superior and middle hemorrhoidal vessels. We believe that if the caliber of the tube over which the anastomosis is made is smaller than the stoma through which it passes, pressure is avoided and the blood supply is not impaired. It is imperative to relieve all pull or tension upon the suture line and to accomplish this the stomach is sutured to the parietal pleura, and the edges of the diaphragm are fastened to the gastric antrum (Fig. 2-B). Novocaine is injected into the phrenic nerve to produce temporary immobilization of the diaphragm. A solution of 200,000 units of penicillin is sprayed partly above and below the diaphragm, and the latter is repaired. There is still no unanimity of opinion as to whether or not closed suction drainage should

be instituted. If this is desired, however, a catheter is brought out through a short incision posteriorly in a lower interspace. We have been using a "T" tube for this suction, placing one limb upward and the other below the lung and toward the mediastinum. The lung is fully expanded and an airtight closure of the chest completes the operation. The stomach now forms an intrathoracic "esophagus" and its blood supply is derived from the right gastric and the right epiploic arteries. On the esophageal side, when the anastomosis is made in the region of the aortic arch, the blood supply to the esophagus is derived from those vessels which descend from the inferior thyroid artery[17].

Much of the success or failure of this procedure depends upon the post-operative care. The lung must be kept re-expanded and atelectasis avoided if possible. Inspissated mucus readily leads to the development of atelectasis, which in turn results in pneumonitis. Chemotherapy, early ambulation, breathing exercises, bronchoscopy and food and fluid balance all play their specific roles in the successful outcome of these cases.

Lewis [18] prefers a right transpleural approach for lesions in the middle third of the esophagus for the following reasons:

1. Only the vena azygos major has to be divided to fully expose the esophagus.
2. Greater accessibility to the upper two-thirds of the thoracic esophagus.
3. The aortic arch and descending aorta instead of being an obstacle become a safety barrier between the surgeon and the other pleural cavity.

However, Nissen[19] in a personal communication to the author has stated that he continues to utilize a left-sided approach for these lesions.

Treatment of Zone 3 Lesions

Although no hard and fast set rules can be applied in every case, most lesions involving the lower part of the esophagus as well as the cardiac end of the stomach can be removed through a combined thoracico-abdominal approach. Marwedel[20], Hedblom[21] and Micheli[22] all had this idea in mind. Humphreys[16] in a personal communication to Garlock mentioned the simplicity of the combind thoracico-abdominal approach. Garlock in turn reported his results with this type of incision in 14 cases, and has become quite enthusiastic about it.

Case Report

The following case is a typical example of a patient with a Zone 3 lesion:

The patient, W.L., a 65-yar-old white male, entered the hospital on May 12, 1947, complaining of difficulty in swallowing which was of 5 months duration. He stated that food of solid consistency had become more difficult to swallow and that he was now living on liquids. There was some anorexia, nausea, eructation and his dysphagia was becoming rapidly worse. Some vomiting of undigested food was also present. In the past 4 months he had lost 29 pounds. Temperature, pulse and respirations were normal and the blood pressure was 132/80. The physical examination was essentially normal. X-ray examination revealed a constriction at the lower end of the esophagus, the exact nature of which could not be determined. The esophagoscopist's report showed that the upper esophagus was filled with fluid and undigested food; the distal esophagus was obstructed at a point 42 cms. from the upper gums. A friable freely bleeding and ulcerating lesion was found at this point. A number 10 Bougie was passed into the stomach, but the esophagoscope could not be advanced into the stomach. Macroscopic impression was carcinoma of the esophagus, however, the tissue removed for biopsy revealed an adenocarcinoma. This report suggested a carcinoma of the cardiac end of the stomach which had invaded the esophagus. A partial gastrectomy and esophagectomy were done followed by an intrathoracic esophagogastric anastomosis. The pathologist reported an adenocarcinoma of the cardiac end of the stomach with extension into the esophagus. The technic of the operative procedure is described below.

This man's postoperative course was completely uneventful. On his second postoperative day his temperature rose to 101° and then rapidly dropped and remained normal from then on. Daily postoperative chest x-rays revealed a mild fibrous pleuritis with a small pleural effusion in the lower left chest and a small pneumothorax. However, breath sounds returned immediately and at no time was any dyspnea present. The absence of pain was a striking factor throughout his entire course. He was out of bed on the third postoperative day and was discharged on the eleventh postoperative day. He is gaining weight and is now eating a liberal diet.

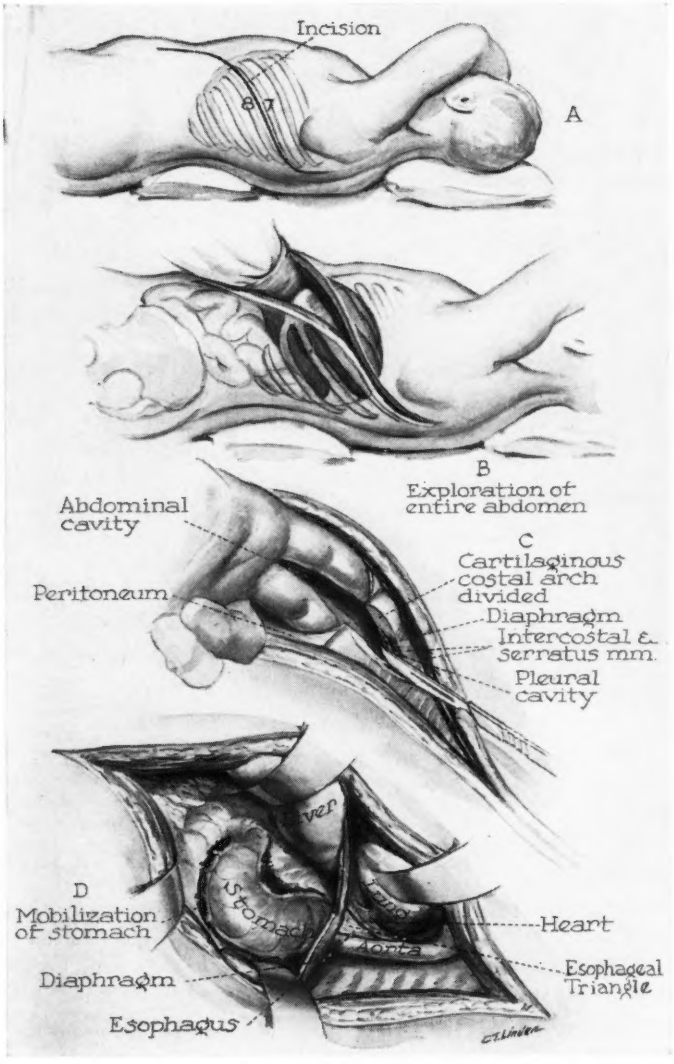

Fig. 3. Surgical Treatment for Carcinoma of the Lower End of the Esophagus and Upper End of the Stomach (Zone 3).

(A). The patient is placed on his right side with a five degree inclination backwards. The incision extends from one or two inches below the umbilicus, over the inner third of the left rectus abdominis muscle, crosses the left costal arch, continues in the seventh intercostal interspace and then turns upward between the left scapula and vertebral column.

(B). The abdominal part of the incision is opened and thorough exploration is carried out to determine operability.

(C). The costal arch is severed, the intercostal muscles and pleura are divided and the pleural cavity is entered. The diaphragm is divided radially from the esophageal hiatus to its peripheral attachment.

(D). Thoracico-abdominal exposure and identification of the esophageal triangle.

Treatment:

Intratracheal positive pressure anesthesia is the one of choice. The patient is placed on his right side with about a five degree inclination backwards. The right knee is bent and the pelvis is strapped to the table. Wide adequate skin preparation and draping are essential to good exposure. Scratch marks identify the seventh, eighth, ninth and tenth left costal cartilages. A left upper rectus incision is made, which extends from or below the umbilicus to the left costal arch (Fig. 3-A). The peritoneal cavity is entered and a thorough exploration done to determine the extent of the growth, fixation to vital structures and the presence of metastases (liver, peripancreatic, pelvic, and diaphragm) (Fig. 3-B). Should the tumor prove to be operable, the incision is extended over the costal arch and then upward and outward in the seventh intercostal interspace. We have found the seventh interspace preferable to the eighth, since it affords better exposure and makes the performance of the anastomosis easier. The costal arch is cut and the pleural cavity is entered (Fig. 3-C). The intercostal muscles and pleura are divided back, well past the inferior angle of the scapula, and the

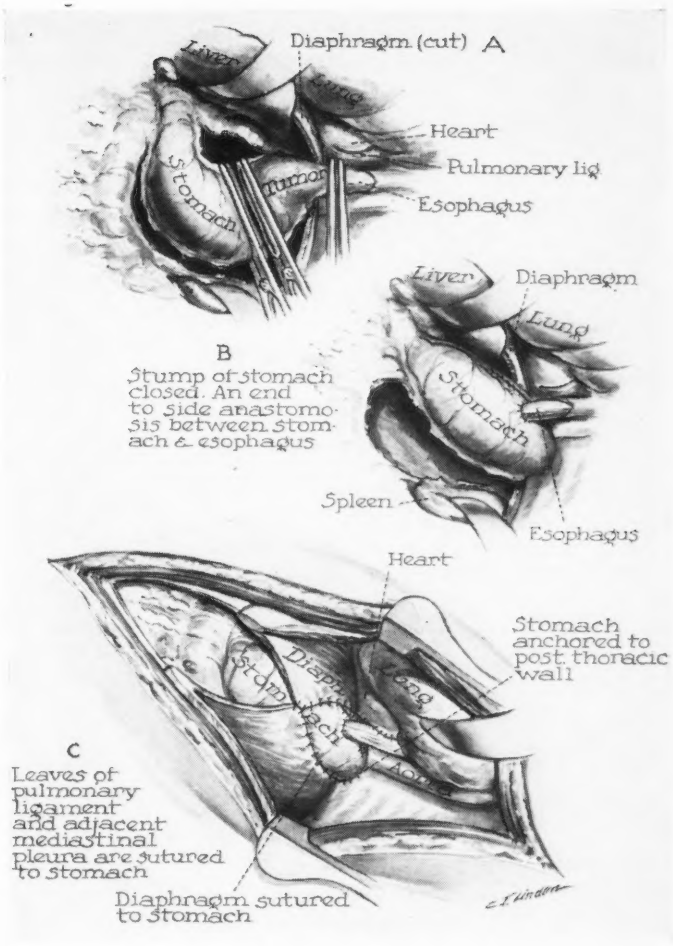

Fig. 4. **Surgical Treatment for Carcinoma of the Lower End of the Stomach (Zone 3) (Cont'd.)**

(A). Removal of the tumor including the lower end of the esophagus and the upper end of the stomach.

(B). Supradiaphragmatic esophagogastrostomy completed.

(C). Repair of diaphragm and prevention of tension on the suture line by suturing stomach to the diaphragm, thoracic wall and adjacent mediastinal pleura.

left leaf of the diaphragm is severed. The latter is divided radically from the esophageal hiatus to its peripheral rib attachment. Large phrenic vessels are encountered which should be properly isolated, divided and tied. The inferior pulmonary ligament is severed; this exposes an esophageal triangle which is bounded in front by the heart, behind by the descending aorta and below by the diaphragm. In this triangle the esophagus can be easily identified (Fig. 3-D). Truesdale[23] has described this anatomic triangle as an aid in locating diaphragmatic herniae. We have also used it in locating the esophagus in transthoracic vagotomies[24].

The technic for the resection and anastomosis is essentially the same as that described under Zone 2 lesions. However, this anastomosis would be infra-aortic as compared to the other which is supra-aortic (Figs. 4-A and 4-B). Through this incision it is possible to resect the spleen and tail of the pancreas with ease, and even a total gastrectomy followed by an esophagojejunostomy becomes possible through it. Carter[25] recently has commented upon the excellent exposure and ease with which splenectomy can be performed through a thoracico-abdominal approach. Closure is accomplished, the diaphragm is repaired, and the now somewhat enlarged esophageal hiatus is sewn to the transplanted stomach (Fig. 4-C). Large perichondral or pericostal sutures are placed. A Bailey rib approximater draws the costal cartilages together and relieves the tension so that the perichondral sutures may be tied. Before the chest is closed, a rubber tube is

inserted in a lower interspace for underwater drainage. The pleura, intercostal muscles and overlying soft tissues are approximated. The abdominal incision is closed in layers. The necessity of a jejunostomy is still subject to much controversy; however, we have found this procedure to be unnecessary.

It is interesting to recall that this type of anastomosis, theoretically at least, should predispose to the formation of peptic ulcer of the esophagus, since the two conditions which frequently are associated with such a lesion, namely short esophagus and intrathoracic stomach (diaphragmatic hernia) are artificially produced. Oddly enough I have been unable to find such ulcers reported following this procedure and it is my belief that the cutting of the vagus nerves which is necessary in the course of this operation prevents the formation of such lesions.

The suture material which I prefer is spool cotton[26]. In an extensive and time consuming procedure such as this, continuous catgut is used only to close the thoracic and abdominal defects. I have never had cause to regret the combined use of cotton and catgut in the same case nor do we hestitate to use cotton on the mucous membrane side of an anastomosis.

We agree with Garlock that the smoother and more rapid postoperative course of these patients, as compared to those who have had rib resection is impressive. The patient herein described was dangling his feet out of bed on the first postoperative day, was out of bed on the third postoperative day, and walked out of the hospital on the eleventh postoperative day.

Summary

1. A zoning of the esophagus into three divisions has proved helpful and practical as an aid to standardizing the surgical treatment for carcinoma of the esophagus, and has been applied in a personal series of 50 cases.

2. Typical case histories of Zone 2 and Zone 3 lesions and their surgical management have been cited.

3. Lesions involving Zone 2 (midthoracic esophagus) are best treated by transthoracic partial esophagectomy and partial gastrectomy with a supra-aortic esophagogastric anastomosis.

4. Zone 3 lesions (lower esophagus and cardiac end of the stomach) are best resected by a combined thoracolaparotomy incision which does not necessitate the removal of any rib or ribs.

5. A modification of the standard incisions is suggested.

6. With the advent of positive pressure anesthesia in the hands of qualified anesthetists, chemotherapeutic agents, expert pre- and postoperative care, and the perfection of surgical technique, such extirpations are made possible, thus providing a new lease on life for these patients who only a few years ago were considered doomed.

* * * * *

BIBLIOGRAPHY

1. Torek, F., The First Successful Resection of the Thoracic Portion of the Esophagus for Carcinoma, J.A.M.A., 60:1533, 1913.

2. Sauerbruch, F., Die Chirurgie der Brustorgane, Berlin, Julius Springer, 2:601-608, 1925.

3. Fisher, H. Esophageal Implantation into Stomach after Intrathoracic Resection of the Esophagus for Carcinoma, Arch. Surg., 12:241 (Jan. pt. 2) 1926.

4. Ochsner, A., and DeBakey, M., Surgical Aspects of Carcinoma of the Esophagus, Jour. Thoracic Surg., 10:401-445, April 1941.

5. Adams, W. E., and Phemister, D. B., Carcinoma of the Lower Thoracic Esophagus; Report of a Successful Resection and Esophagogastrostomy, Jour. Thoracic Surg., 7:605, 1938.

6. Garlock, J. H., The Problem of Cancer of the Esophagus, Jour. Mt. Sinai Hosp., 7:349, 1941.

7. Carter, B. N., Stevenson, J., and Abbot, O. A., Transpleural Esophagogastrostomy for Carcinoma of Esophagus and Carcinoma of Cardiac End of Stomach, Surgery, 8:587, 1940.

8. Jonas, A. F., Transpleural Esophagogastrostomy: Report of a Successful Case, Arch. Surg., 44:556 (March) 1942.

9. Marshall, S. F., Carcinoma of the Esophagus: Successful Resection of Lower End of Esophagus with Reestablishment of Esophageal Gastric Continuity, Surg., Clin. North Amer., 18:643, 1938.

10. Cattell, R. R., cited by Bird, C. E.: Recent Advances in Surgery of the Esophagus, Surgery, 6:617, 772 and 949, 1939.

11. Churchill, E. D., and Sweet, R. H., Transthoracic Resection of Tumors of the Stomach and Esophagus, Annals Surg., 115:890-919, June 1942.

12. Rehn, Operationem an dem Brustabschmitt der Speiserohre, Verhandl. d. deutsch. Gessellsch. f. Chir., 27:448, 1898.

13. Faure, J. L., and Demoulin, A., Cancer se la portion thoracique de l'oesophage. Extirpation du neoplasme par la voie mediastinale posterieure droite, combinee a une incision cervicale, Bull. et men., Soc. de chir., 29:122, 1903.

14. Wendel, W., Beitrag zur endothorakalen Oesophaguschiurgie, Arch. f. klin. Chir., 83:635, 1907.

15. Sweet, R. H., Carcinoma of the Midthoracic Esophagus: Its Treatment by Radical Resection and High Intra-

thoracic Esophagogastric Anastomosis, Annals Surg., 124: 653-666, October 1946.

16. Garlock, J. H., Combined Abdominothoracic Approach for Carcinoma of Cardia and Lower Esophagus, Surg., Gynec., and Obst., 83:737-741, December 1946.

17. Ohsawa, T., The Surgery of the Oesophagus, Arch. f. Jap. Chir., 10:605, 1933.

18. Lewis, I., The Surgical Treatment of Carcinoma of the Esophagus, Brit. Jour. Surg., 34:18-32, 1946.

19. Nissen, R.: Personal Communication with Author.

20. Marwedel, G., Zbl. Chir., 30:938-941, 1903.

21. Hedblom, C. A., Surg., Gynec., and Obst., 35:284-287, 1922.

22. Micheli, Italienscher Chirurgen Kongretz, 1895.

23. Truesdale, P. E. Diaphragmatic Hernia: Varieties and Surgical Treatment of the Hiatus Type, Amer. J. Surg., 32:204 (May) 1936.

24. Thorek, P., Vagus Nerve Section (Vagotomy) in the Treatment of Peptic Ulcers, J.A.M.A., 135:1141-1145, Dec. 1947.

25. Carter, B. H., The Combined Thoracico-abdominal Approach with Particular Reference to its Employment in Splenectomy, Surg., Gynec., and Obst., 84:1019-1028, (June) 1947.

26. Thorek, P., Five Years Experience with Spool Cotton as a Suture Material, Amer. J. Surg., 71:652-656, May 1946.

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ASPECTS OF THE PATHOLOGY OF NUTRITIONAL DISEASES

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IN MOST textbooks of general pathology there is a relatively small chapter, entitled either Vitamins or Deficiency Diseases. This chapter generally concerns itself with tissue changes resulting from the lack of one or more vitamins or other factors in the diet. On the other hand, however, it is apparent that in practically every chapter of the same books, brief reference is made to the role that nutritional factors play in the pathogenesis of a number of conditions. So, for example, reference is made to the roles that methionine and cystine, in addition to vitamins, play in the pathogenesis of liver diseases; calcium and phosphorus in bone diseases; iron and the still unknown extrinsic antipernicious factor in some blood diseases; cholesterol in atherosclerosis; iodine in thyroid diseases; and many other examples. We can safely state that there is no organ in the body which will not show functional or morphological changes when one or more nutritional factors are either lacking or in excessive amounts in the diet. The problem of pathology of nutritional diseases is therefore one of great magnitude and importance. The pathologist who is interested in this field must study not only the effects on body tissues which result from the lack or excess of one or more nutritional factors but also the roles that nutritional factors have in predisposing to and modifying tissue changes caused by other disease agents.

The existence of diseases due to faulty nutrition or deficiency diseases has been recognized for a long time. The clinical features of rickets, scurvy and pellagra, for example, have been known for centuries. Rickets was first described by Whistler, and scurvy by Lind and Cook back in the 17th century; pellagra was recognized for the first time by Casal and again by Frapolli in the 18th century. However, although the clinical features of rickets, scurvy, pellagra, and other diseases of nutritional origin have been known for many years, studies of the actual basis of these conditions, i.e., studies of their pathology and pathogenesis, were not undertaken until the end of the 19th century. In 1883 Barlow first described the tissue changes associated with the scorbutic state; two years later Pommer described those occurring in rickets in humans. In spite of these contributions, little was added to our knowledge of the pathological changes occurring in nutritional diseases until much later when Aschoff, and also Hojer, (1920-1925) in Germany gave us a more complete and accurate description of the pathological changes of scurvy, while Denton (1925-28) described those of pellagra both in humans and in the experimental animal. A

(The opinions expressed in this paper are those of the author, and do not necessarily represent the official views of any governmental agency.)

more scientific approach to this problem began particularly with Wolbach in 1927. He was responsible for the first experimental study to demonstrate not only the importance of the "antiscorbutic factor" in scurvy but also the fundamental nature of this factor in the normal growth and development of connective tissue throughout the body. A considerable amount of work has been done since the pioneer studies of Wolbach. We can say that practically everything we know at present about the pathological changes occurring in nutritional diseases has come to light during the last 20 or 25 years, but that still only the surface of the problem of Pathology of Nutritional Diseases has been scratched.

In most branches of medicine our knowledge of the pathological changes of each disease has, as a rule, preceded and as a matter of fact greatly contributed to the study and understanding of the associated physiological or physio-pathological processes. This has not been the case in the field of Nutritional Diseases and there are several reasons to explain why it has not been so. First, and most important, is the fact that the Science of Nutrition is a very modern science. Second, pathologists, just as the clinicians, in the past, have always associated diseases with positive agents such as bacteria, parasites, viruses, toxins etc., and apparently have had difficulty in adjusting themselves to the idea that some diseases at least may be caused by a "lack of something." Third, and also important, is the fact that the pathological changes associated with deficiency conditions are often not conspicuous nor are they as characteristic and specific as the changes produced for example by bacteria. It should be added here that nutritional diseases due to the total lack of one or more nutritional factors are uncommon, at least in the United States; moreover, the partial or subclinical deficiencies which instead are probably widespread are associated with even less obvious or characteristic tissue changes. We must bear in mind that human tissues in general can react in only a limited number of ways to either positive or negative agents or stimuli of different kinds. Conspicuous or specific changes due to the lack of such relatively simple chemical structures as vitamins or amino acids are found in some instances; in many others, however, the pathological findings are minimal and not characteristic.

The morphological approach to the study of tissue changes should therefore be supplemented, especially in nutritional diseases, by more modern methods, some of which have been developed only in recent years. These methods include determination of the actual chemical changes occurring in tissue by direct chemical analysis or by histochemical methods, and localization in the tissues of essential nutrients by physical methods such as fluorescence studies or autoradiographic techniques with the use of radioactive tracers. Direct chemical analysis of tissues at autopsy, especially in experimental studies, has yielded important information particularly with regard to the organ location of different nutritional factors and to the part that different organs play in the metabolism of these substances. Examples of this are the high concentrations of ascorbic acid in the adrenal cortex and pituitary gland, and of Vitamin A in the liver. Histochemistry, by means of specific chemical reactions to produce colored and therefore visible substances, is a very useful tool to detect in which cells of the particular organ these substances are concentrated. The exact locations of lipids, iron, glycogen, ascorbic acid, etc. have been studied with this technique. Fluorescence studies have given the same type of information utilizing the fact that some of the vitamins, such as Vitamin A and thiamine, emit specific radiations in the visible spectrum when exposed to ultraviolet light. Historadiographic techniques using radioactive "tracers" have been applied so far particularly to the study of some of the essential elements such as phosphorus, iron, iodine, etc. The tracer technique is fast becoming popular and will greatly facilitate a more rapid progress, particularly in the closely allied fields of nutritional and metabolic diseases. Without using some of the above techniques (which are often impractical or impossible in man) the pathologist at times is unable to detect any alterations in the tissues. In such cases he must assume that the patient or the animal died before tissue changes had time to develop. As a general rule we can say that pathological changes will be more severe and obvious in chronic protracted deficiencies than in the acute forms.

In the following tables are listed the essential nutrients (Tables 1, 2, 3). Although it would be impossible and beyond the purpose of this paper to discuss these substances in any detail, it should be observed that lack of any of them either alone or in combination may produce changes in the

TABLE 1

Essential Elements

Hydrogen	Magnesium	Copper
Carbon	Calcium	Zinc
Nitrogen	Phosphorus	Sulphur
Oxygen	Chlorine	Cobalt
Sodium	Fluorine	Manganese
Potassium	Iodine	Iron

TABLE 2

Essential Amino Acids		*Essential Fatty Acids*
Tryptophane	Leucine	Linoleic acid
Lysine	Isoleucine	Linolenic acid
Histidine	Threonine	Arachidonic acid
Arginine	Methionine	
Phenylalanine	Valine	

TABLE 3

Vitamins

Vitamin A	Thiamine
Vitamin D	Riboflavin
Vitamin E	Nicotine acid
Vitamin K	Pantothenic acid
	Pyridoxine
	Choline
	Biotin
Ascorbic acid	Folic acid
Vitamin P	Inositol
	Paraaminobenzoic acid

TABLE 4

(modified from Follis)

Nutritional Deficiencies in Man

1. Exogenous—Partial or total lack of nutritional factors in diet
2. Endogenous
   a. Interference with intake (anorexia, edentia, lesions of the mouth and esophagus etc.)
   b. Interference with absorption (hypermotility of intestinal tract, absence of digestive secretions etc.)
   c. Interference with storage or utilization (hepatic diseases)
   d. Increased excretion (polyuria, endocrine imbalance etc.)
   e. Increased requirements (increased metabolism, pregnancy, conditions of stress etc.)
   f. Inhibition of "anti" substances (not definitely proven in man).

tissues. These changes can then be studied either by the routine or special techniques.

These single essential nutrients must all be furnished from exogenous sources, at least for man and other animal species. Experimentally of course it is relatively easy to eliminate one or more of these essential nutrients from the diet and to study the pathological changes which develop from the deficiency. Experimental studies of this type in animals are fundamental to the understanding and interpretation of similar pathological changes which may be present in human tissues. In man a discrete single deficiency as produced in these experimental animals occurs only rarely. Most of the nutritional diseases occurring in man are in fact combined deficiencies and it is clear that unless we know the type of changes due to the lack of a single nutritional factor it may be very difficult to interpret the changes caused by combined nutritional deficiencies. Several nutritional diseases occurring in man, such as scurvy and pellagra, which in the past were considered as due to lack of a single nutritional factor, are now thought to be combined deficiencies. These combined deficiencies are naturally more difficult to evaluate and to understand. Experimentally the study of syndromes resulting from the lack of several essential nutrients has just recently been attempted but it may yield important results.

In addition to inadequate nutrient intakes due to such exogenous factors as food habits or tolerances, economic necessities, or circumstances brought about by war, nutritional diseases may be caused in man by a number of endogenous factors which can lead to deficiencies in spite of the adequacy of the diet as shown in the following table (Table 4).

At the Army Medical Nutrition Laboratory we have classified and listed nutritional disease entities as they occur in man. Their number amounts to 49 and I am sure the list is not quite complete. They have been classified as being (1) due to lack or excess of water, calories, proteins, lipids, minerals, vitamins, (2) combined deficiencies or (3) diseases of food ingestion (this last group being due to toxic factors which may be present in food).

In conclusion we can say that it is clear that the field of Pathology of Nutritional Diseases is a very important, extensive, and complicated one. Its many facets, chemical, metabolic, and physiological, make its study one of the most difficult and fascinating in the entire field of pathology. Although progress has been great during the last 30 years many of its problems are still to be solved.

Fig. 1. Vit. A deficiency in man. Keratitis follicularis on the elbow. (From Eddy and Dalldorf, The Avitaminoses, 1944. Courtesy of Williams and Wilkins Co., Publishers.)

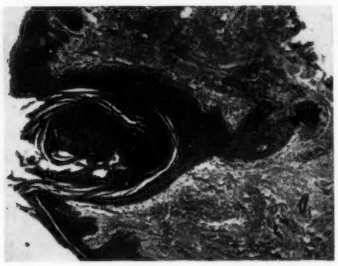

Fig. 2. Vit. A deficiency in man. Keratitis follicularis. Keratotic plug in hair follicle. (From Eddy and Dalldorf, The Avita-minoses, 1944. Courtesy of Williams and Wilkins Co., Publishers.)

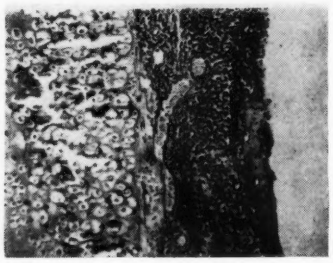

Fig. 3. Vit. A deficiency in man. Squamous metaplasia and chronic inflammatory changes in a bronchus. (From Eddy and Dalldorf, The Avitaminoses, 1944. Courtesy of Williams and Wilkins Co., Publishers.)

Fig. 4. Vit. D deficiency. Rickets. Marked rachitic rosary at costo-chondral junctions. From the Dr. J. A. Fordyce Collection: Courtesy Mr. E. C. Jagle. (Neg. No. 86697 Army Institute of Pathology.)

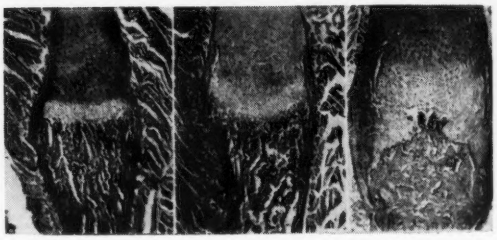

Fig. 5. Vit. D deficiency. Experimental rickets. Low magnification of costo-chondral junctions. Left: mild; middle: moderate; right: severe rachitic changes. (From Eddy and Dalldorf, The Avitaminoses, 1944. Courtesy of Williams and Wilkins Co., Publishers.)

Fig. 6. Vit. C deficiency. Scurvy. Extensive subcutaneous hemorrhages, so-called "black leg." (From Eddy and Dalldorf, The Avitaminoses, 1944. Courtesy of Williams and Wilkins Co., Publishers.)

REFERENCES

1. Bricknell, F., and Prescott, F., The Vitamins in Medicine, Grune and Stratton, Publishers, New York, N. Y., 1946.
2. Eddy, W. H., and Dalldorf, G., The Avitaminoses, Williams and Wilkins Co., Baltimore, Maryland, 1944.
3. Follis, R. H., The Pathology of Nutritional Disease. C. C. Thomas, Publisher, Springfield, Illinois, 1948.
4. Wolbach, S. B. and Bessey, O. A., Tissue Changes in Vitamin Deficiencies, Physiol. Rev. 22:233, 1942.

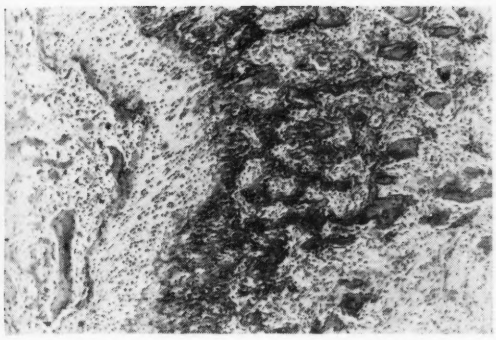

Fig. 7. Vit. C deficiency in guinea pig. Scurvy. Microscopic changes in bone at epiphyseal line. Note irregular rows and degeneration of cartilage cells (left), fibrosis of marrow spaces (right) and abnormal bone trabeculae (center).

Fig. 8. Nicotinic acid deficiency. Pellagra. Dermatitis. Note scaly lesions and pigmentation of skin. (Neg. No. 80992 Army Institute of Pathology.)

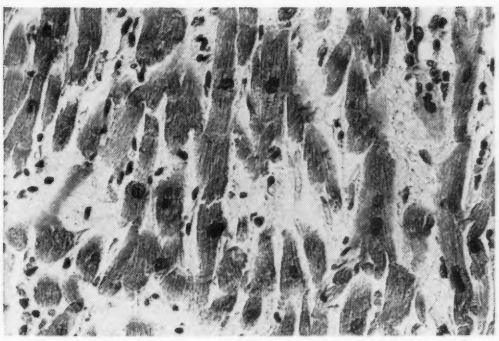

Fig 9. Thiamine deficiency in man. Beriberi. Myocardial changes characterized by abnormal granularity and fragmentation of the sacoplasma and by marked intrstitial edema.

New Books in the Library

American Diabetes Ass'n. Proceedings. vol. 8, 1948.
Anderson & Parmenter. Experimental neurosis in the sheep and dog. 1941.
Baldwin, E. Comparative biochemistry. 3d ed. 1948.
Biddle & Van Sickel. Introduction to psychiatry. 1943.
Biochem. Research Foundation. Neutron effects on animals. 1947.
Blackwood, O. H. General physics. c1943.
Block & Bolling. Amino acid composition of proteins and food. 1947.
Bohn, G. Les invertrebres, arthropedes, mollusques et echinodermes. 1935.
Brain, N. R. Diseases of the nervous system. 3d ed. 1948.
Carriere, G. La diphtherie. 1936.
Christopher, F. Surgery. 4th ed. 1948.
Collins, J. The doctor looks at literature. 1923.
Degowin, Hardin, Alsever. Blood transfusion. 1942.
Demancte, R. Technique du sero-diagnostic de ua syphilis. 3d ed. 1944.
Ewing, O. R. The nation's health. 1948.
Faust, E. C. Human helminthology. 2d ed. 1939.
Florkin, M. Biochemical evolution. 1949.
Frey-Wyssling, A. Submicroscopic morphology of protoplasm. 1948.
Gordon, M. Biology of melanomas. 1948.
Gortner, R. A. Biochemistry. 2d ed. 1938.
Grawitz, B. B. Experimentelle grundlagen su einer modernen pathologie. 1946.
Ham & Salter. Doctors in the making. 1943.
Jeanneney & Ringenbach. Traite de la transfusion sanguine. 1940.
Kiser, C. V. Group differences in urban fertility. 1942.
Krantz, W. Topographische dermatologie. 2te aufl. 1944.
Lereboullet, P., et al. Endocrine glands and the sympathetic system. c1922.
Lewin, P. The foot and ankle, their injuries, diseases. 3d ed. 1947.
McCormick, C. O. Pathology of labor, puerperium and the newborn. 2d ed. 1947.
Mons, W. Rorschach personality test. n.d.
Patty, F. A., ed. Industrial hygiene and toxicology. vol. 1. 1948.
Myers, J. A. & McKinley, C. A., ed. Chest and heart. 2 vols. 1948.
Ohio State University. Comly & Coleman fund for med. and surg. research. Collected reprints. vols. 2, 3, 4, 1941-1947.
Recent Progress in Hormone Research. vol. 3. 1948.
Sahyun, M., ed. Amino acids and proteins. 2d ed. 1948.
Sturgis, C. C. Hematology. c1948.
Thoma, K. T. Oral surgery. 2 vols. 1948.
Truex & Kellner. Atlas of the head and neck. 1948.
Turchini, J. Cellule-embryologie. 1943.
United States. Vital statistics, 1946-1948. 2 vols.
Weaver, H. C. Mainspring . . . story of human progress. 1948.
Welcher, F. J. Chemical solutions. 4th printing. 1947.
Yearbook of general therapy, 1948.
Yearbook of industrial and orthopedic surgery, 1948.
Yearbook of obstetrics and gynecology, 1948.
Wood Medical Review, vol. 1, 1947.
Advances in protein chemistry., vol 4, 1948. 5 B Ad 9.
Alvarez. Gastro-enterology. 4th ed. 1948. 16 C Al B.
A.A.A.S. History of the association. 1948. 1 Bb Am 3.
A.M.A. New & non-official drugs. 1948. 22 D Am 3.
Anderson & Keefer. Therapeutic value of penicillin. 1948. 22 E An 2.
Christian, H. A. Principles & practice of medicine. 16th ed. c1947. (Formerly Osler .....) 6 G C 46.
Craig, C. F. Laboratory diagnosis of protozoan diseases. 2d ed. 1946. 10 K C 64.
D'Amour & Blood. Laboratory work in mammalian physiol-

THE RELATION OF NATIONAL HEALTH LEGISLATION TO THE HEALTH OF THE INDIVIDUAL

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FOR sometime now there has been a growing dissatisfaction with the staus of medical care in the United States. Without going into the figures concerning the per capita distribution of physicians, hospitals and other health services, it is only necessary to point out that organized medicine has so far gone against former principles of rugged individualism as to give its blessing to group practice and to voluntary health insurance plans. Since this is the case it appears that both opponents and proponents of national legislation directed toward alleviation of the maldistribution of medical care are agreed that the problem exists. The disagreement is concerned with the solution of the problem. We must be grateful that the existence of the problem is granted by most of the protagonists because this represents a very long step away from the former stand that no problem existed.

It must be obvious that it is useless to discuss again the inadequacy of medical care in certain areas of this country or among certain economic groups. It is necessary only to decide how medical care can be provided on a more adequate basis and more evenly distributed. It should be obvious too, that any approach to the solution of this problem requires the cooperation of the medical profession since no problem affecting the health of people can be succesfully approached without the aid of the medical profession.

In a general way we may say that two types of plans have been proposed:

1. Plans that operate on a **voluntary** basis.
2. Plans that make compliance **compulsory.**

Here again we must carefully define the limits of the controversy. It is not a question of arguing the merits of one voluntary plan as opposed to another; nor is it a question of arguing the merits of one kind of compulsory plan as opposed to another. The basic disagreement is concerned with the merits, if any, of a **voluntary** plan as opposed to a **compulsory** plan. It is understood that beneficiaries under either type of plan are entitled to the services of a physician.

What is a voluntary plan? This type of plan implies that people who prefer to protect themselves against any sudden exigencies attendant upon an illness may do so by buying an insurance policy with a private carrier who contracts to pay their medical expenses to the extent set forth in the policy. This type of plan also implies that physicians may or may not, as they individually desire, support such a plan.

What is a compulsory plan? This type of plan implies that all persons must by law support a medical care plan which by its very nature must be designed to serve all the people. Although a plan like the voluntary plan does not force the compliance of physicians, this can only be of academic significance, since the successful operation of such a plan would require the cooperation of all physicians or at least a great majority.

What, then, are the merits of a voluntary plan as opposed to a compulsory plan?

1. It is a plan. Therefore, it is better than no plan at all.
2. It will provide medical care at a reasonable and predictable financial rate to all who voluntarily seek recourse to it.
3. It will attract the necessary number of physicians to make it workable.

A voluntary plan will, therefore, be helpful to those who support it. But here we must interject two questions:

1. **Can** everyone afford to support a voluntary plan? Obviously not. A certain percentage of the population of this country have incomes so low that they cannot buy life insurance let alone health insurance.
2. **Will** everyone support a voluntary plan? Again obviously not; a certain percentage of people subscribe to that philosophy which postulates that "It can't happen to me." Witness, in this respect, the necessity to make liability insurance on automobiles compulsory before any considerable percentage of automobile owners could be induced to protect not only themselves but their fellow-men.

These would not be serious questions except for one factor. The people who make up the group who could not or would not support a

voluntary plan are just the group that most often find medical care a most serious financial burden; namely, the low income groups. It may be argued, as it is, that these groups are normally provided for by already existing government and charitable organizations. This is quite true except that people will avoid utilization of these facilities unless dire necessity dictates. Under such circumstances the patient frequently presents himself in a state, which, to say the least, is not as amenable to treatment as would be the case if an early diagnosis had been made. It may also be mentioned in passing that in most communities these institutions do not offer facilities necessary to the practice of preventive medicine.

Does a compulsory plan do any more than a voluntary plan? It may or it may not, depending on the details, but it does have one theoretical advantage. It makes **all** the people beneficiaries. If we could let that statement stand with no qualifications no reasonable individual would argue with it. The controversy centers about the implementation of such a program. It can only be effected through taxation. And it is customary to energetically resist any and all new tax proposals. It is unfortunate too, that resistance is frequently inversely proportional to the effect of the tax on the public weal. Witness the resistance to taxes for military purposes as compared to the resistance encountered for proposals designed to eradicate slum areas.

Since there is no way at present other than general taxation to support a compulsory health plan it is useless to use the fact of taxation against it. There are those who will not willingly dismiss this aspect of the plan; however, their objections are non-specific, so to speak, as the same group resists taxation on principle. If we recognize it as non-specific, we can reasonably dismiss it as irrelevant to the argument.

The recent legislation introduced into Congress commonly known as the Wagner-Murray-Dingell Bill is designed as a compulsory health plan to furnish reasonably adequate medical care to a large segment of the population of the U. S. particularly those in the middle and lower income brackets. Briefly it may be summarized as follows:

1. It covers not only those who pay the tax, but also those who cannot, whenever their contributions are made by a public agency
2. It provides all services necessary to prevention, diagnosis and therapy of disease including specialist consultation, dental care and home nursing.
3. It is financed by a tax of 1.5% of earnings up to $3600.00, a sum which is matched by the employer. If a deficit develops the government makes up the difference.
4. Physicians are free to join the plan or not as they choose. If they do choose to support the plan they are to be paid according to fees agreed upon by local authorities.
5. The local authority includes lay and professional members. Strictly medical matters are to be left completely in the hands of physicians.
6. There is provision for free choice by both patients and physicians. Patients may choose their physician, dentist, hospital or nurse as the case may be. On the other hand, physicians are free to reject patients if they so choose.
7. The Bill also provides for an increase in the number of hospital beds by 600,000 by 1960. It also proposes to double the number of medical graduates.
8. In essence the bill is an extension of the Social Security principle.

Should this bill become law and be successfully administered, its theoretical benefits to the community and the individual are obvious. It can only mean a better health status. It means that the individual will seek consultation at an early stage of illness from competent authority, the physician, rather than reserve such measures for a last resort. It means that the individual will be able to take advantage of the advances in preventive medicine rather than wait until illness is apparent. It means that recovery will be speeded through adequate nursing care. It means that doctors will be available in areas where they were available before only with difficulty. It means that in all areas in the U. S. at least 90% of children born will have physicians in attendance, thus decreasing still further the infant mortality rate. And in addition to these concrete benefits it offers certain intangible benefits such as peace of mind, another type of freedom from want and a more intelligent populace.

This is indeed a rosy picture and one which is difficult to deny contemplation.

MICROBIAL TRANSMUTATIONS

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TRANSMUTATION denotes a directed change in the character of inorganic or organic species. It is perhaps best illustrated by the transformation of physical elements. Nitrogen (N^{14}) can be converted into radioactive carbon (C^{14}) through the bombardment of the atomic nuclei with neutrons. This is a definite and reproducible reaction. No other element of the periodic table will arise in this process.

In biology we generally deal with mutations, that is, undirected changes in the hereditary make-up of an organism, arising spontaneously or induced by exposure to X-rays or certain chemical agents. Modern genetics is built around the production and interpretation of such changes. Recent studies on morphological mutations in the fruitfly, Drosophila, and physiological mutations in the bread mold, Neurospora, have aroused great interest among biologists. Yet, it must be pointed out that the changes in phenotype, such as the shortening of a wing vein in the fruitfly or the loss of an enzyme in the mold, which are brought about by very intricate experimental techniques, remain haphazard and unpredictable, hence cannot be considered analogous to those resulting from the transformation of physical elements.

The first biological transmutation was performed by Griffith (1) in 1928. He came across it more or less accidentally in an epidemiologic study of pneumococcal types. Pneumococci are distinguished by the possession of large capsules, which are composed of a variety of polysaccharides. The antigenic type of pneumococcus depends on the nature of the polysaccharide of its capsule. A capsule may be lost spontaneously by prolonged cultivation of the pneumococcus on artificial media or by growing the organism in the presence of its type-specific antiserum. Capsulated pneumococci are designated as smooth (S), non-capsulated pneumococci as rough (R), chiefly because of the nature of their growth in various media. Griffith discovered that he could convert a rough strain back into the original smooth type by injecting into a mouse a mixture of live rough organisms and heat-killed smooth organisms. Subsequently he succeeded in transforming rough pneumococci derived from one type into smooth pneumococci of a different type in vivo in the presence of heat-killed smooth organisms of the second type.

In 1931 Dawson and Sia (2) were able to carry out a pneumococcal transmutation in vitro, using rough pneumococci, heat-killed capsulated cells and a high concentration of R-antiserum. Identical results were obtained by Alloway (3, 4) with crude cell-free extracts of smooth pneumococci.

In the early '40s, the problem was re-attacked by a group of investigators at the Rockefeller Institute. Their first objective was to purify and identify the agent responsible for the observed phenomenon of transmutation (5). It may be worth while to describe briefly their experimental procedure. Fifty liters of a broth culture of type III pneumococcus were centrifugated and the organisms re-suspended in a solution of sodium chloride and sodium citrate in distilled water. Then a 10 per cent solution of sodium desoxycholate, a compound derived from bile which has the property of lysing pneumococci, was added. From the lysed bacterial cells proteins were removed by precipitation with a mixture of chloroform and amyl alcohol, polysaccharides and ribonucleic acid by fractional precipitation with ethyl alcohol. Finally, treatment of a saline extract from previously precipitated material with a small amount of alcohol in the presence of Ca^{++} ion resulted in the formation of a viscous flocculate, which was shown to be homogeneous in nature and upon chemical analysis turned out to be a desoxyribonucleic acid (DNA). Its activity as a transforming agent was very high, as low a concentration as 1:600,000,000 being sufficient to bring about the conversion of an R strain derived from type II (R^{II}) into an S strain of type III (S^{III}). It should be noted here that the amount of transforming agent obtainable from S^{III} organisms created in this process is far in excess of the

minimal amount added for the induction of transformation, which means that the amount of specific DNA must somehow increase in the bacterial cells.

The isolation of DNA did not yet constitute an adequate proof of the nature of the transforming principle. Small amounts of protein might be attached to the crystals of DNA; these would not be detectable by the analytical methods available at the present time. To meet such objections, further evidence of the identity of DNA with the transforming agent had to be found. McCarty and Avery (6) set about preparing a purified desoxyribonuclease from beef pancreas. In the presence of small amounts of Mg^{++} ion as little as 0.005 μg. of their enzyme preparation per ml. of DNA solution inactivated the transforming principle irreversibly and completely. Desoxyribonuclease activity can be measured by the reduction in viscosity of DNA solutions. The viscosity of DNA in solution is related to the degree of polymerization of its constituent nucleotides. Native nucleic acids are very viscous and have a correspondingly high molecular weight of 1,000,000 or more. The specific enzyme acts by splitting the large DNA molecule into several smaller parts. It is inhibited by citrate because the latter binds Mg^{++} in a firm combination. In the preparation of DNA from pneumococci, citrate is added before the lysis of the bacterial cells to inactivate small amounts of desoxyribonuclease present in pneumococcal cells, which would be sufficient to destroy the transforming principle. The final results of enzyme studies have proved beyond any doubt that only desoxyribonuclease could inactivate the transforming agent, whereas other enzymes such as various proteases and ribonuclease were unable to do so.

Studies on the role of R-antiserum in the transformation of pneumococci were undertaken by McCarty and Avery (7). They revealed that R-antiserum contains at least three factors which are required to "sensitize" the bacterial cell to the action of the transforming principle. First of all, R-antiserum by virtue of its content of R-antibodies leads to the aggregation of the rough pneumococci in a growing culture. This seems to be an initial prerequisite. The same result can be effected by growing the cells in normal serum to which small amounts of agar have been added. A second factor is dialyzable and appears to be of the nature of a phosphate or pyrophosphate. The third factor is non-dialyzable and can be replaced by organ extracts, preferably of the spleen or thymus. McCarty and his co-workers speculate that the non-dialyzable serum factor is an enzyme, which is activated by the dialyzable phosphate. It acts on non-encapsulated pneumococcal cells in the aggregated state, preparing them in some manner for the entry of the specific DNA required for capsule formation.

At about the same time that work on pneumococcal transformation was so successfully advanced at the Rockefeller Institute, a number of French workers under the leadership of Boivin (8) were able to transform a strain of **Escherichia coli** (C_2) into an antigenically different strain (C_1). They succeeded in isolating a DNA from strain C_1 and in bringing about the transmutation of C_2 into C_1 in its presence. No serum was required in the process. An additional difference between strains C_2 and C_1 lies in their enzymic constitution. C_2 possesses the enzyme saccharase, C_1 does not, nor does a transformed C_1 strain derived from C_2. Thus in this particular instance the process of transmutation involves not only a change in antigenic type but also the loss of an enzyme. It is of interest that attempts to reverse the process, that is, to convert C_1 into C_2, have failed.

Another successful transformation was performed with the virus of rabbit fibroma. Berry and Dedrick (9) employed the in vivo technique of Griffith in converting this virus, which is of a benign nature, into the virulent virus of infectious myxomatosis in the presence of heat-killed suspensions of the latter.

Other attempts at transmutation have been reported, yet the results obtained are not always clear-cut, hence their interpretation remains open to debate. With our present techniques, we can hardly expect to effect experimental transformations but between very closely related types of organisms, differing probably in not more than one DNA in their genic make-up. It should also be borne in mind that any DNA introduced from without must fit structurally into the chromosomal pattern of the cell. From this it would seem evident that the field of potential transmutations is severely restricted.

Thus far we have dealt only with one function of DNA, next to protein the principal constituent

of chromosomes, which contain the basic determinants of cellular characters, yet there are present in all cells, animal, plant and bacterial, large amounts of ribonucleic acid (RNA). It would appear to be of major interest to determine the respective roles of DNA and RNA. In studies carried out by the French workers (10) it was found that, for example, DNA made up between 1 and 5 per cent and RNA between 5 and 15 per cent of the total dry weight of various bacteria. RNA, in particular, seemed to be largely dependent upon the age of the culture examined. In one experiment a 5-hour culture of an organism contained 15.3 per cent of RNA, a 2`-hour culture of the same organism only 8.7 per cent of RNA. In explanation of this and similar phenomena a very interesting theory has been advanced. Desoxyribonucleic acids are assumed to be the primary determinants of all characters, the genes located in the chromosomes of the nuclei of plant and animal cells and present in an apparently more dispersed state in bacterial cells; they exist in combination with proteins, which may or may not be of a specific nature. Ribonucleic acids, on the other hand, are secondary controlling factors in the cytoplasm and as such govern the enzymatic equipment of the cell. That is why they are present in such large amounts in young cells, which are in need of rapid reproduction, and decrease in quantity as a culture ages.

The question arises whether transformation may not be carried out by transference of such secondary controlling factors from one organism to another. Some initial research has been done on this subject. Spiegelman (11) showed that adaptation of a yeast to a certain sugar was accelerated in the presence of a nucleoproteic fraction from cells of the same species already adapted to it. This factor was called "adaptin" by its discoverer. It may be a RNA according to its chemical reactions, but conclusive evidence is still lacking.

What then is the significance of microbial transmutation? Has this phenomenon any application to other fields of biological study and to medicine? No definite answer can be given at this time. Too many factors remain to be explored, but the theoretical implications of this work at least are considerable. The two outstanding findings of the American and French investigators may be stated as follows: (1) Heritable and predictable modifications can be induced; (2) the active agent reproduces itself in the transformed cells. This may help us to direct research in the fields of virology, oncology and genetics into new and fruitful channels. Yet much will depend upon the extent to which we shall be able to advance our knowledge of nucleic acids. Numerous problems on this subject await a solution. They include studies on the mode of multiplication of nucleic acids, on nucleic acid structure, on the manner in which a nucleic acid enters the cell and finds its place in the cellular pattern. There is also the matter of nucleic acid specificity. Chemically all desoxyribonucleic acids are alike, as antibodies are composed of gamma-globulin, yet they are concerned with the determination of a large variety of processes, some directing the structural pattern, others the metabolic behavior of the cell. The transforming principle is only one of many desoxyribonucleic acids. That means that of the total amount of DNA which is transferred to non-capsulated pnuemococci for the purpose of transforming them into capsulated cells probably only very few molecules are active in the production of the capsule. Any method which would serve to further differentiate nucleic acids would constitute a great advancement in our understanding of the nuclear processes.

It is to be hoped that future investigative work will uncover new factual material of value to our knowledge of directed mutations.

BIBLIOGRAPHY

1. Griffith, F., J. Hyg., 27, 112. 1928.
2. Dawson, M. H., and Sia, R. H. P., J. Exptl. Med., 54, 681. 1931.
3. Alloway, J. L., J. Exptl. Med., 55, 91. 1932.
4. Alloway, J. L., J. Exptl Med., 57, 265. 1933.
5. Avery, O. T., MacLeod, C. M., and McCarty, M., J. Exptl. Med. 79, 137. 1944.
6. McCarty, M., and Avery, O. T., J. Exptl. Med., 83, 89. 1946.
7. McCarty, M., Taylor, H. E., and Avery, O. T., Cold Spring Harbor Symposia of Quant. Biology, 11, 177. 1946.
8. Boivin, A., Delaunay, A., Vendrely, R., and Lehoult, Y., Compt. Rend. 221, 718. 1945.
9. Berry, G. P., and Dedrick, H. M., J. Bat., 31, 50. 1936.
10. Boivin, A., Vendrely, R., and Tulasne, R., Bull. acad. med. 131, 39. 1947.
11. Spiegelman, S., Cold Spring Harbor Symposia of Quant. Biol., 11, 256. 1946.

CURARE [1]

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SEVERAL years ago during a study of phosphorylation of thiamine, we found, to our surprise, that large doses of this vitamin killed some of the dogs; respiration stopped, but the heart continued to beat for several minutes. We were intrigued by the discovery that thiamine was not exclusively the benign beneficial vitamin essential to life, but was quite dangerous in large doses. Since then we have investigated the toxic effects of thiamine systematically (1) and found the similarity between the toxic action of thiamine and the action of curare (2); this observation had been made before (3, 4) but is not generally known.

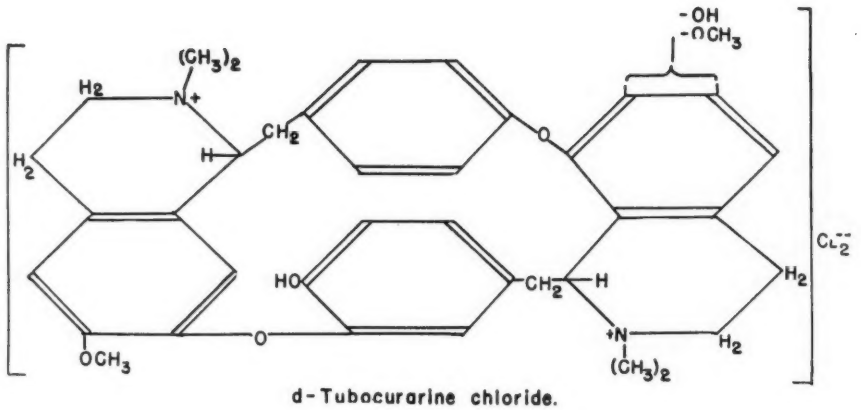
In this article the term "curare" will be applied to any substance which blocks the neuromuscular junction and the autonomic ganglia. In most of the experiments reported, curare **per se** was not used; it is a crude preparation generally derived from South American plants belonging principally to the genus **Strychnos;** such crude curare preparations are called tubo-, pot-, gourd-, or calabash-curare, depending on the container in which the natives store the material (5, 6). In most experiments reported here either d-tubocurarine, a crystalline product, or curarine, a purified product, or Intocostrin, a mixture of purified alkaloids, was used.

Many substances have curare-like or curariform activity; Craig (7) lists hundreds of them.

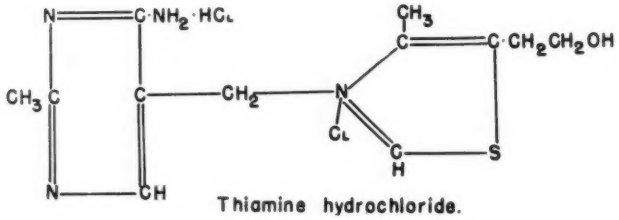
In attempts to explain why so many different substances have curariform activity, some work has been done relating chemical structure to curariform activity. Holmes, Jenden, and Taylor (8) conclude that curariform activity depends on the magnitude of the positive charge on the central atom of the quaternary ammonium group. (See Fig. 1 for the chemical structure of d-tubocurarine.) Pfeiffer (9) indicates that two ring structures separated by an optimum distance accounts for the curariform activity of d-tubocurarine. Barlow and Ing (10) prepared salts in which quaternary ammonium groups were attached at the ends of polymethylene chains; they show that as the chain is lengthened the curariform activity rises to a maximum with a 10-carbon chain, then falls sharply with longer chains.

Many, although by no means all, materials that have curariform activity are quaternary ammonium compounds (Fig. 1). Other materials, somewhat similar in structure, for example, tetraethylammonium salts, are weakly curariform at the neuromuscular junction, but resemble curare closely by blocking the autonomic ganglia. Other materials, again somewhat similar in structure, for example, prostigmine, diminish the effects of curare. Finally, acetylcholine, which also contains a quaternary ammonium group, seems to be the transmitter in many structures, namely, across the neuromuscular junction, across nerve-nerve junction, in autonomic ganglia, at postganglionic parasympathetic endings, at postganglionic cholinergic sympathetic endings, as well as in nerves themselves. Because of the fact that the transmitter in these structures is acetylcholine, they have been termed "cholinergic" structures. Limitations of the action of curare to the neuromuscular junction, autonomic ganglia and some parts of the central nervous system may be due to "a structural barrier (that) protects nerve and muscle fiber against the action of methylated quaternary ammonium salts. These compounds act only on the postganglionic membrane, which apparently is either less or not at all protected" (Fig. 2; Nachmansohn (11)).

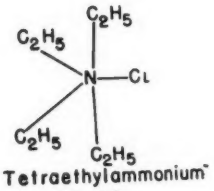
The predominant effect of agents having the typical curare effect is block of the neuromuscular junction. This effect occurs if curariform substances are given intramuscularly or by slow intravenous injection; it has been known since the classical fundamental work of Claude Bernard (12) in 1857. McIntyre (5) explains the action by pointing out that curare effects could be caused either (a) by a failure in production of acetylcholine, or (b) by a rise in the threshold to acetylcholine. The second explanation appears the more likely because the author himself found that acetylcholine is produced even during complete neuromuscular block (5, p. 106). Torda and Wolff (13) show that certain materials such as uric acid, pyrrole, alloxan, and others, decrease



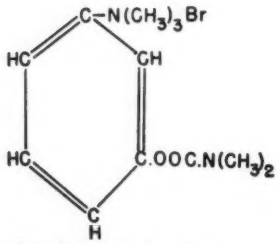
d-Tubocurarine chloride.



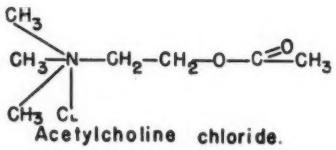
Thiamine hydrochloride.



Tetraethylammonium chloride.



Prostigmine bromide.



Acetylcholine chloride.

Fig. I

acetylcholine synthesis in muscle but do not decrease the sensitivity of muscle to acetylcholine; they conclude that "in this their action differed from that of curare" (p. 390). A more fundamental explanation of the action of curare is as follows: Apparently acetylcholine "depolarizes the end plate region, and curare prevents this depolarization by competitive inhibition" (14, p. 452). The term "competitive inhibition" is not only fashionable but also of theoretical interest since many substances of similar chemical structure, as was pointed out previously, affect the neuromuscular junction but produce various effects on it.

Several substances act as anti-curare agents by increasing the concentration of acetylcholine, possibly to a concentration which exceeds the threshold that has been raised by curare. Physostigmine and prostigmine are both potent cholinesterase inhibitors (15), and the latter is the recommended antidote for curare poisoning (15, 16, 17, 18). Di-isopropyl fluorophosphate (DFP) is a strong inhibitor of cholinesterase (11, 19, 20) and is also antagonistic to the curarizing action of many materials, such as d-tubocurarine and quinine (21).

The second action of curariform materials is block of the autonomic ganglia (15). If these

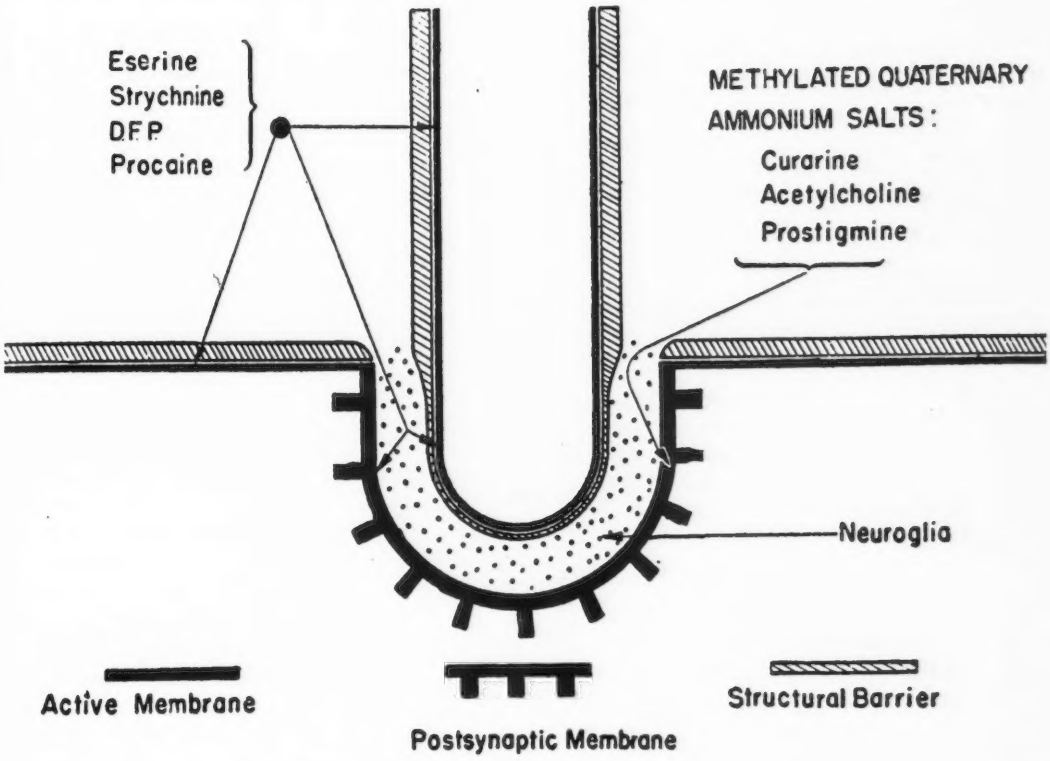


Fig. II

materials are injected very rapidly, in large doses, or so that high concentrations are achieved, in addition to neuromuscular junction block (and assuming that artificial respiration is given) one obtains bradycardia, hypotension, and vasodilation (1, 2, 22, 23), hemorrhage into the intestinal mucosa (24), possibly as a result of stasis due to hypotension, and relaxation of smooth muscle (25). Salivation may be produced by moderately large doses but is inhibited by still larger doses (26).

Unpublished results obtained in our laboratory show that the hypotension after curare is not exclusively due to autonomic block; after the autonomic ganglia are blocked by tetraethylammonium salts (27) or after the sympathetic postganglionic endings are blocked by dibenamine (28, 29), d-tubocurarine still causes a further fall in blood pressure. This further fall is thought to be due to vasodilation resulting from loss of tone of the voluntary skeletal muscles, which, in turn, is due to the block at the neuromuscular junction.

Other unpublished results indicate that the action of d-tubocurarine is not limited to blocking those structures that maintain vascular tone or heart rate, namely the sympathetics; d-tubocurarine also blocks the parasympathetics. This is shown by the following experiment. D-tubocurarine usually causes a bradycardia, but if the vagus is stimulated, thereby increasing vagal tone and slowing the heart, d-tubocurarine now causes a tachycardia.

Acetylcholine, acting at neuromuscular junctions and in autonomic ganglia, is blocked by curare; this is termed the "nicotinic" action of acetylcholine. Acetylcholine, acting at parasympathetic postganglionic endings, is blocked by atropine; this is termed the "muscarinic" action of acetylcholine. Thus curare is usually not considered to act on parasympathetic postganglionic endings, nor is atropine usually considered to act on the ganglia and at the neuromuscular junction. In contrast to this classical picture, Luco and Mesa (30) describe experiments in which they claim to show that curare in large doses

blocks transmission between postganglionic parasympathetic nerves and corresponding effectors; thus curare behaves like a muscarinic drug; Luco and Altamarino (31) show that atropine, in large doses, blocks the neuromuscular junction and thus behaves like a nicotinic drug. Luco and Mesa (30) suggest that curare inhibits all transmission of the cholinergic type, each system requiring a different concentration of curare.

Although the neuromuscular junction is considered to be cholinergic, some interesting reports have appeared showing that epinephrine may be involved at this structure. Rosenblueth, Lindsley, and Morison (32) demonstrate that epinephrine has an anti-curare effect at the neuromuscular junction. Maddock, Rankin, and Youmans (33) verify these results and show that the anti-curare effect of epinephrine can be abolished by dibenamine.

Confusing and paradoxical results are reported for the curariform action of tetraethylammonium salts. They block autonomic ganglia (27) and thus behave like curare does on those structures. They have weak curariform action as measured by the rabbit head drop method (21, 34). They also behave like veratrinic drugs (35, 36) and as such sensitize the muscle fiber itself to acetylcholine. Some of our unpublished results show that tetraethylammonium bromide actually increases muscle contraction. These results may be interpreted to mean that the veratrinic effect exceeds the curariform effect; thus a mild block at the neuromuscular junction is obscured by a markedly increased sensitivity of the muscle fiber itself to acetylcholine, and the resulting contraction is greater than normal.

Much has been written regarding the effect of curare on the central nervous system. I will mention only one paper on this subject, that of Smith and collaborators (37). This group gave a dose of d-tubocurarine two and one half times that required for complete muscular paralysis to a human subject (the courageous Dr. Smith himself). Atificial respiration was maintained as required, and the subject communicated with his colleagues by speech when able, by prearranged signs when unable to talk, and on recovery, dictated an account of his sensations experienced during complete paralysis. There was no change in the electroencephalogram, in the electrocardiogram, in consciousness, or in the sensorium as a result of the treatment. The authors concluded that d-tubocurcarine has no significant central nervous system stimulating or depressing actions, nor does it produce analgesia.

Preparations of curare sufficiently pure for human use are now available. Work has not stopped at this point, however; recently (38, 39) the dimethyl ether of d-tubocurarine has been prepared; its curariform activity is more than three times that of d-tubocurarine.

The therapeutic use of curare products is based on their ability to block the neuromuscular junction and thereby relax voluntary muscles. Fortunately not all skeletal muscles are relaxed equally by curare; some are effected by smaller doses than others. The following list of muscle groups is arranged in order of decreasing sensitivity: muscles of the upper lid, extra-ocular muscles of the eye, muscles holding the head erect, long muscles of the back, muscles of the extremities, intercostal muscles, diaphram. Recovery occurs in the reverse order.

If injections are made intramuscularly or slowly by vein, no ganglionic effects are encountered. The most serious danger from curare lies in paralysis of respiratory muscles. Since, even in the hands of skilled anesthesiologists, curare preparations vary in their effect from patient to patient, a means of positive pressure artificial respiration should always be available when curare is to be used.

Clinically, curare is used for many purposes.

It is used as an adjunct to anesthesia to improve muscular relaxation. Curare decreases the amount of all gaseous anesthetic agents required to produce muscular relaxation. In the case of cyclopropane this decreases the possibility of producing cardiac arrhythmias. Curare is useful with the intravenous barbiturate anesthetics, since they are not noted for producing good muscular relaxation. Curare is also useful with nitrous oxide, which is an incomplete anesthetic. Curare may also be used to produce apnea when the movements of the diaphram interfere with the operative procedure. Under such conditions, of course, respiration is maintained by insufflation.

Curare may be used to soften the convulsions in shock therapy, to relax muscles in tetanus, and to facilitate various manipulative procedures, such as the reduction of fractures.

It may be used in the diagnosis of **myasthenia gravis.** Patients with this disease are paralyzed

by doses of curare which do not affect a normal person.

The details of the clinical use of curare preparations can be found in the literature (16, 17, 40, 41, 42).

So, in this brief article, some of the interesting phases of the physiology and pharmacology of curare have been described. Through the work of many investigators, curare, known to civilization for some three centuries and to stone age men since dim antiquity, has been developed from an arrow poison to a potent tool for the modern physician and surgeon. Its unique pharmacological properties will increase its usefulness as they become more universally known; its highly specific action has already contributed much to our knowledge of the physiology of the neuromuscular junction. It may become a key, unlocking further information regarding nerve and muscle.

BIBLIOGRAPHY

1. Smith, J. A., P. P. Foa, H. R. Weinstein, A. S. Ludwig, and J. M. Wertheim, J. Phar. exp. Therap., 93, 294. 1948.
2. Smith, J. A., P. P. Foa, and H. R. Weinstein, Science, 108, 412. 1948.
3. Demole, V., Kongressber. XVI, Int. physiol. Kongr., 19. 1938.
4. Pick, E. P., and K. Unna, J. Pharm. exp. Therap., 83, 59. 1945.
5. McIntyre, A. R., Curare, University of Chicago Press, Chicago, 1947.
6. Jackman, A. W., and R. Hecht, Quarterly, The Chicago Medical School, 1 (2), 24. 1941.
7. Craig, L. E., Chem. Rev., 42, 285. 1948.
8. Holmes, P. E. B., D. J. Jenden, and D. B. Taylor, Nature, 159, 86. 1947.
9. Pfeiffer, C. C., The Modern Hospital, Dec., 1948.
10. Barlow, R. B., and H. R. Ing, Nature, 161, 718. 1948.
11. Nachmansohn, D., Bull. Johns Hopkins Hospital, 83, 463. 1948.
12. Bernard, C., Les Tissus Vivants, Paris, 1857.
13. Torda, C., and H. G. Wolff, Am. J. Physiol., 147, 384. 1946.
14. Acheson, G. H., Fed. Proc., 7, 447. 1948.
15. Goodman, L., and A. Gilman, The Pharmacological Basis of Therapeutics, The Macmillan Company, New York, 1941.
16. Anonymous, Physicians' Bulletin, 14, 21. 1949.
17. Anonymous, Curare in Clinical Medicine, E. B. Squibb and Sons, New York, 1948.
18. Burke, J. C., C. R. Linegar, M. M. Frank, and A. R. McInture, Anesthesiology, 9, 251. 1948.
19. Hunt, C. C., and W. F. Riker, Jr., J. Pharm. exp. Therap., 91, 298. 1947.
20. Foa, P. P., Quarterly, The Chicago Medical School, 9 (2), 7. 1948.
21. Chase, H. F., J. L. Schmidt, and B. K. Bhattacharya, J. Pharm. exp. Therap., 91, 236. 1947.
22. Unna, K., M. Kniazuk, and J. G. Greslin, J. Pharm. exp. Therap., 80, 39. 1944.
23. Unna, K., and J. G. Greslin, J. Pharm. exp. Therap., 80, 53. 1944.
24. Cole, F., I. D. Baronofsky, and O. H. Wangenstein, Surgery, 21, 881. 1947.
25. Gross, E. G., and S. C. Cullen, Anesthesiology, 6, 231. 1945.
26. Pichard, R., and J. V. Luco, J. Pharm. exp. Therap., 80, 62. 1944.
27. Acheson, G. H., and G. K. Moe, J. Pharm. exp. Therap., 87, 220. 1946.
28. Nickerson, M., and L. S. Goodman, J. Pharm. exp. Therap., 89, 167. 1947.
29. Nickerson, M., and G. M. Nomaguchi, J. Pharm. exp. Therap., 93, 40. 1948.
30. Luco, J. V., and J. Meza, Ciencia (Mexico), 2, 298. 1941.
31. Luco, J. V., and M. Altamarino, Am. J. Physiol., 139, 520. 1943.
32. Rosenblueth, A., D. B. Lindsley, and R. S. Morison, Am. J. Physiol., 115, 53. 1936.
33. Maddock, W. O., V. M. Rankin, and W. B. Youmans, Proc. Soc. Exp. Biol. Med., 67, 151. 1948.
34. Ing, H. R., Physiol. Rev., 16, 527. 1936.
35. Krayer, O., and G. H. Acheson, Physiol. Rev., 26, 383. 1946.
36. Eyzaguirre, C., B. P. Folk, K. L. Zierler, and J. L. Lilienthal, Jr., Am. J. Physiol., 155, 69. 1948.
37. Smith, S. M., H. O. Brown, J. E. P. Toman, and L. S. Goodman, Anesthesiology, 8, 1. 1947.
38. Collier, H. O. J., S. K. Paris, and L. I. Woolf, Nature 161, 817. 1948.
39. Stoelting, V. K., J. P. Graf, and Z. Vieira, Proc. Soc. Exp. Biol. Med., 69, 565. 1948.
40. Doud, E. A., and G. Shortz, Anesthesiology, 7, 552. 1946.
41. Schlisinger, E. B., Am. J. Med., 1, 518. 1946.
42. Harroun, P., F. E. Beckert, and C. W. Fisher, Surg., Gyn., Obst., 84, 491. 1947.

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PRACTICAL MANAGEMENT OF OBESITY

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THE therapy of obesity seems to be simple and easy—on paper. In reality it is simple and easy in but a small number of cases; in some of these it had been accomplished by the subjects themselves, without medical help. In the majority of cases, however, reduction of marked overweight to near-normal levels is a difficult task that taxes the knowledge, experience and patience of the physician as much, if not more, than any other therapeutic effort. It fails in some cases in spite of strenuous and expert medical attention.

Diagnosis

Obesity, i.e. overweight due to excessive fat deposits, is readily recognized. Gain of weight may be due to edema which, however, is easily differentiated. On the other hand, additional increase in weight due to edema or other causes might be overlooked in an obese person. A middle aged woman, obese for years, consulted me because of a recent additional gain of 20 lbs. in weight; an examination disclosed that this was due to the rapid growth of a huge overian cyst. No patient should be accepted for weight reduction without a careful history and physical examination, for the following reasons: 1) There may be present some associated pathological condition connected with the obesity as a cause or as a sequel—such as psychoneurosis, hypoglycemia, glandular disturbances, hypertension, myocardial disease, diabetes, postural defects etc.—and 2) The obese person may be harboring diseases entirely unconnected with his obesity, some of which such as anemia, certain gastrointestinal diseases, tuberculosis, syphylis, beginning malignancies may be masked and therefore not readily suspected in obesity. Such associated or co-incidental conditions must be attended to independently from the reducing regime, or else must be taken into consideration for modifications of or contra-indications to the reducing regime. On the other hand, special laboratory tests including the much vaunted basal metabolism test have little usefulness in the practical management of obesity unless indication for such studies emerge from the history or physical findings.

Furthermore, the type of fat distribution over the various regions of the body has but a very limited value in the diagnosis. There is a widespread misconception, based on earlier erroneous statements of some medical writers, that most or all disproportionate fat deposits in obesity are due to some glandular disturabnce. As a matter of fact, most of such "anomalies" of fat distribution simply represent exaggerated versions of tendencies that occur in *normal-weight persons.* Thus, there is a general tendency in the normal female for somewhat more fat deposition around the pelvis and thighs, while the normal male frequently shows a tendency for relative thickness of the subcutaneous fatty layer over the upper body. Accordingly, when a woman gains weight an exaggerated form of the normal female distribution of fat resulting in the so-called middle-segment or lower-body types of obesity may develop; when a man becomes obese he may develop the upper-body type. Similarly, due to the normal tendency to deposit some excess fat in the abdomen after middle age, especially large abdomens develop in both sexes when obesity sets in or increases after middle age. Finally, in most normal-weight people an individual pattern of subcutaneous fat distribution, of constitutional and hereditary nature, can be recognized; some have a fuller, others a thinner face, or the neck, arms, abdomen, lower legs etc. contain noticeably different amounts of subcutaneous fat. When such persons become obese, the regions with original tendency to fat deposition attract much more fat than the regions with less original tendency, resulting in conspicuous disproportional pictures. There is no doubt that the great majority of the fat distribution forms in obesity belong to this category; that is, they represent individual, constitutional patterns that have become exaggerated in the process of general gain of weight; having nothing to do with abnormal glandular function.

Nevertheless, three special types of regional fat distribution in obesity do have a certain diagnostic value. One is the female type of fat distribution if found in a male, indicating male hypogonadism. Another is the male type of fat distribution if found in a female, sug-

gesting masculinization. The third is the characteristic fat, round face and large abdomen (with relatively skinny legs) found in both sexes as a part of Cushing's syndrome, indicating adrenal disturbance.

Therapy

Until we will know more about the basic causes of obesity than we know now, or until we will have at our disposal more efficient means to depress the appetite mechanism than we possess now, the main therapy of obesity remains the imposed low caloric diet. There are two main tasks of the physician in the dietary treatment of obesity: 1) To prescribe a diet which is low in calories but contains all essential food elements in amounts required for good health. 2) To help the patient to follow the diet for as long a period of time as necessary.

1) By 'low caloric diet' we mean a diet that contains less calories than the subject's caloric output. It would seem then that before prescribing such a diet one would have to determine or calculate the patient's daily total caloric output. This would be actually necessary if we would want to prescribe a diet *slightly* lower in calories than the output. However, for reasons that need not to be explained here, such diets are not practical in the office management of obesity. Diets useful for such management must be *much* lower in calories than the caloric output—about one-half to two-thirds of it—and for this purpose the following simple rule, based on the weight of the patient, may serve as sufficiently accurate to assure the desirable caloric deficit. At 150 lbs. body weight 1000 calorie diets may be given; at 200 lbs., 1200 to 1400 calories; at 250 lbs. and above, 1400 to 1800 calories. Somewhat lower diets may be needed to produce satisfactory losses of weight for patients with very low basal metabolic rates or for those confined to bed. Diets as low as 600 calories daily, containing all needed protein and carbohydrate with the addition of vitamin—mineral preparations, can be used without harm for as long as there remain excessive fat deposits, but few subjects are willing to follow such diets for any length of time. All these diets are described in detail in many text books and need not be repeated here. The diet list should be discussed with the patient in all details with due attention to food allergies, points of economy and —as much as possible—the likes and dislikes of the patient.

2. A most important part of the practical management of obesity derives from the obvious fact that diet lists, regardless how carefully constructed, fail to do any good unless consistently followed by the patient. It is because of this fact that selection of a suitable diet is but the first step on a long road. The rest of the treatment consists in a peculiar type of psychotherapy aimed to support the patient in his daily struggle with his appetite and the temptations of ever-present food. For this purpose the patient should be required to return at frequent intervals, preferably weekly. Sooner or later, after losing some weight but still at a high body weight level, the patient usually stops losing weight or gains weight due to his failure to follow the diet. Further success or total failure depends, then, largely on the physicians' psychological management of the case.

The physician's attitude must be balanced between sympathetic understanding of the patient's difficulties and firmness in demanding co-operation. The ratio of these two attitudes cannot be the same for all patients, not even for the same patient at all times, some requiring more sympathy, others more sternness; one must study the patient's personality to arrive at the ratio that is right for the individual case, and one must be ready to reverse the ratio if the patient's unfavorable response warrants it.

Part of the physician's task at this time is educational in nature, in that the patient should be allowed and encouraged to ask questions that enter his mind concerning all aspects of obesity. The patient's interest in details of the diet, the caloric values of foods, food equivalents and substitutions should be aroused, if necessary, and gradually developed to a high degree. It is remarkable how successfully this can be done even with children and those with little formal education, evidently because of the genuine interest of the obese in food. But the diet itself is only a small part of the curriculum. The obese individual frequently entertains erroneous ideas about the nature and origin of obesity, especially of *his* obesity ideas, which he can utilize consciously or otherwise as convenient excuses for his failure in following dietary restrictions. The physician must patiently listen to such misconceptions, expose the errors and give the correct answers in a way and form which is understood and accepted by the patient.

A favorite misconception of some obese per-

sons is that dieting is particularly difficult or unsuccessful in their case because their obesity is "natural," present in other members of the family, inherited. One should then point out that the low caloric diet is necessarily effective in all forms of obesity whether inherited or not, in the same way as insulin is effective in diabetes regardless of its hereditary or other origin. Other commonly heard objections are that the patient "knows" obese persons who had lost all their overweight without dieting, or "knows" other people who eat tremendous amounts of rich food without gaining weight. Such stories should not be lightly taken or abruptly dismissed. On the contrary, it must be explained to the patient that statements of people about their eating are not always reliable, that casual watching of somebody's eating does not reveal that person's total food intake, and that careful observation in the hospital of such seemingly inexplicable cases when they were kept under close supervision on measured food intake had verified the caloric calculations without exception. Still another, particularly vehement, objection to the usefulness of the diet in *his* case is that "I tried it before practically starving as long as a week, and didn't lose a pound." In answering this one we explain that retention of water can occur replacing lost fat, and that had the patient continued with the diet another week he would have been rewarded with a loss of 6 to 8 lbs. during that period. Retention of water leading to temporary failure to lose weight in spite of adherence to the diet may occur at any time, especially premenstrually, during a reducing regime. It is important to keep this in mind in order to avoid *unjustly* accusing the patient with dietary indiscretion—a mistake which is sure to lead to a dangerous crisis in the physician-patient relationship. Fortunately, such periods of water-retention are usually of short duration, rarely extending over more than 3 to 4 days, and are then followed by rapid loss of the retained water. Accordingly, if a heretofore co-operative patient fails to lose weight over a short period of time, we should consider the possibility of water-retention, and look at the situation with critical eye only when the failure continues over more than a week. The patient must never be allowed to persist in the belief that his is a case of "mystery" that defies the mathematics of food-weight dependence, and still less allowed to feel that the physician himself is doubtful or puzzled on that score.

It is interesting, from the psychological point of view, that many obese persons "honestly" underestimate the amount of their own food intake while over-estimating the food intake of everybody else. This is, of course, the result of a sort of subconscious self-deception and must be distinguished from deliberate misstatements which will be considered presently. One hears time and again intelligent and otherwise perfectly reliable obese patients announce that they had adhered to the diet rigorously; then, on closer scrutiny, recalling slight infractions, and finally, on insistent questioning, remembering gross violations of the diet. It seems that they are able to suppress such frustrative events deep into the subconscious mind and to resist efforts to bring them up into the open. In such cases the patient should be required to keep an accurate "diet diary" in which she records in all detail each meal at the time it is consumed. Awareness that she would have to report infractions may suffice to prevent her from committing them.

It is a different story when the obese patient transfers her fight against her appetite to one against her physician. In statements concerning her eating she may then try to mislead, fool, trip and embarrass him with all means at her disposal from tearful protestations of innocence to patent lies. Infinite patience, a powerful sense of humor and cheerful firmness may be required in face of such tactics if we are to convince the patient that she is not fooling anybody but herself. An example of the extent to which efforts to mislead the physician can be carried was presented by a young obese co-ed who asserted that after unsuccessful efforts with moderate low caloric diets she was recently put on a 600 calories diet which she "conscientiously" followed, under the care of her doctor, for 2 months with the result that she *gained* 4 lbs. (I advised her to go to a hospital where she lost without any difficulty 50 lbs. in 4 months on a 1200 cal. diet. When she left the hospital I asked her if she would care to explain how she could gain weight at home on the 600 cal. diet when she lost so much weight in the hospital on 1200 cal. diets. She answered quietly, "Please make your own conclusions.") Hospitalization never fails to solve these "mysteries" and should be resorted to if all other efforts to obtain co-operation prove unsuccessful.

Attention must be paid to the patient's personal emotional problems as they emerge during the reduction regime. It is common observation that obese patients who were losing weight week after week under dietary management stop losing or even begin gaining weight in connection with emotional upsets due to family troubles, financial worries, etc. Such tensions and anxieties usually cause loss of appetite and loss of weight in underweight or normal-weight people because of inhibition of the hunger mechanism. But the powerful hunger mechanism of the obese is not easily inhibited by such impulses, and they maintain their strong appetite; at the same time the emotional strain weakens their *control* over their appetite with the result that they pay less attention to the restrictions of the diet. At such times discussions of the causes of the emotional upset followed by advice, reassurance and encouragement will help much more than stern insistence on discipline.

While these forms of psychological and educational support are an essential element of the management of most cases of obesity, basic psychotherapy with analysis of hidden emotional conflicts and complexes is needed in but a small percentage of cases. It is true that many obese persons are emotionally immature, imbalanced or disturbed; in the majority of these, however, the emotional disturbance appears to be a sequel rather than a cause of overweight. Thus, frustration and inferiority complex are common sequelae of obesity, the overweight causing lack of social success, and earlier defeats in attempts to lose weight leading to deterioration of self-confidence. They can be helped by successful reduction of weight rather than by psychological analysis. In some individuals, however, emotional disturbance may be a causative element of overweight. It appears that a genuinely strong appetite mechanism can be used as an outlet for emotional tensions of any origin; such tensions are transferred to the nervous pathways of the appetite mechanism, causing excessive eating and overweight, in a manner as tensions are transferred, in other persons, to the nervous mechanism of the heart causing tachycardia or extrasystoles. One would expect then that in such cases of obesity analytic psychotherapy, in disclosing and dissolving the basic tensions, would result in loss of the excess appetite and loss of weight without an imposed diet. Unfortunately, this is very rarely the case, and I have yet to see an obese person who has lost weight on *spontaneous* eating as a result of psychotherapy alone. This failure is due to the well known capacity of the appetite mechanism for conditioning. Increased appetite usually continues as a habit for a long time after elimination of causative tensions, with the result that the subject will maintain his over-weight or gain more until he will follow a restricted diet against his eating impulses. Accordingly, cases of obesity with marked psychoneurosis require dietary treatment as do other cases, but will have an easier time in following through, and will be more easily prevented from recurrence of obesity, by previous successful analytic psychotherapy.

Administration of drugs has a limited value in the treatment of uncomplicated obesity. Benzedrine or dexedrine sulphate as a means to depress the appetite is worth trying in every case except in the presence of marked hypertension or psychoneurosis. In some cases its effect is quite noticeable and appreciated by the patient, in others it is negligible. The effect usually wanes after a few weeks but may re-appear on renewed administration after the drug has been discontinued for some time. The usual dose is one tablet—10 mg. benzedrine or 5 mg. dexedrine—before breakfast and another tablet before lunch. It may produce some unpleasant side-effects such as insomnia, dryness of mouth, bad taste in the mouth, emotional depression, etc. in which case the dose should be reduced or the drug discontinued altogether. In so far as thyroid administration is concerned it is, of course, indicated and very useful in the presence of myxedema. It is also worthy of trial in other cases with fatigue, lassitude, low blood pressure, dryness of the skin, cold intolerance, slow pulse, menstrual disturbance, mild secondary anemia, tendency to headaches, with or without a low basal metabolic rate. Experience has shown that in some of these cases small doses of desiccated thyroid—usually one to three grains daily—may relieve these symptoms as well as help losing weight. The dose must remain well below that which would produce the slightest signs of thyrotoxicosis; the idea to help weight loss by increasing the caloric output through elevation of the basal metabolic rate to toxic levels should never be entertained.

POULTRY AS A SOURCE OF HUMAN DISEASE

By OSCAR FELSENFELD, M.D.
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DISEASES transferred from animals to man have their peculiar and particular geography and ecology. Their occurrence depends on the food habits and on the agriculture of the different regions of the world. For instance, Hindoos, as a rule, do not eat beef. They do, however, raise cattle. Thus infections propagated from cattle to man by direct contact will be found among them, while diseases acquired by eating contaminated beef will be very rare or absent.

Thanks to the great educational efforts of the U. S. Department of Agriculture, poultry husbandry has become more and more popular in the United States during the last years. In addition, high prices of beef and pork, and scarcities, induced many people to eat more poultry than before. As a result of these trends the health authorities have been compelled to pay more attention to the proper supervision of poultry meat. A drive was started to improve federal poultry inspection. "Inspection" consists of post-mortem examination of poultry by a qualified veterinarian. Such poultry is labeled "U. S. Inspected". This service, rendered by the U. S. Department of Agriculture, is still in its infancy. Much poultry is not being inspected but only "graded" according to external signs, as the structure of the skeleton and the consistency of the meat (muscles). "Grading" examination is performed on birds before killing. Thus poultry marked as "U. S. Graded" is not subjected to post-mortem inspection by a qualified veterinarian and cannot be considered in every case free from infection or other pathology.

Brandly (1) presented a very thorough study of the dangers harbored by uninspected poultry meat. From the diseases listed by him, we shall consider here salmonellosis, listerellosis, brucellosis, swine erysipelas, tuberculosis, encephalitis and ornithosis.

Salmonellosis is very frequent in poultry. It may cause septicemia, which leads to the spread of the organisms through the body, including muscles (meat) and bones. Such a septicemia is very frequent in fowl because birds, with the exception of some water fowl, do not have lymphatic glands which would check the spread of such infections. Or there are localized foci of disease, as ovarian involvement which is frequent in S. pullorum infections.

Edwards and Bruner (2) and Hinshaw et al. (3) were the first to point out the relationship of avian and human salmonellosis in the United States. Felsenfeld et al. (4) found similar conditions in the Caribbean. According to these findings, when the consumption of poultry increases, Salmonella strains which are present in the poultry in that particular region, become more frequent also in man. Edwards et al. (5) and Felsenfeld and Young (6, 7) isolated several times the same Salmonella strain from human patients and from the uninspected food these patients consumed just prior to the development of their illness. Salmonellosis is becoming more and more appreciated by clinicians. Epidemiologists are focusing increased attention to diseases caused by Salmonella. It is evident that progress in sanitation and food inspection will ultimately eradicate such infections.

Listerellosis is not a frequent disease, only a few more than two dozen cases having been described in man. The organism, however, is not too readily identified, except when isolated from the blood or from the cerebrospinal fluid. Poultry is known to suffer from necrotic lesions caused by Listerella. More careful study of this subject is much needed.

Brucellosis is considered a disease of swine, cattle and goats. In Eastern Europe, however, poultry is often infected with Brucella. Brandly (1) quotes Bergman of the University of Wisconsin who found positive agglutination tests with Brucella antigens in poultry on farms where animals were infected with brucellosis. Collected evidence seems to justify our belief that poultry may carry Brucella and transfer it to other animals or man. The pathologic findings in experimentally infected birds are not always extensive and may be mistaken for lesions of other provenience. It is to be hoped that further experimentation will shed more light on this problem.

Swine erysipelas usually causes only local lesions in man and is chiefly contracted by housewives handling meat from infected animals.

While infected pork, due to the proper supervision during meat inspection, rarely causes infection, uninspected poultry and fish may be the source of such disease in man.

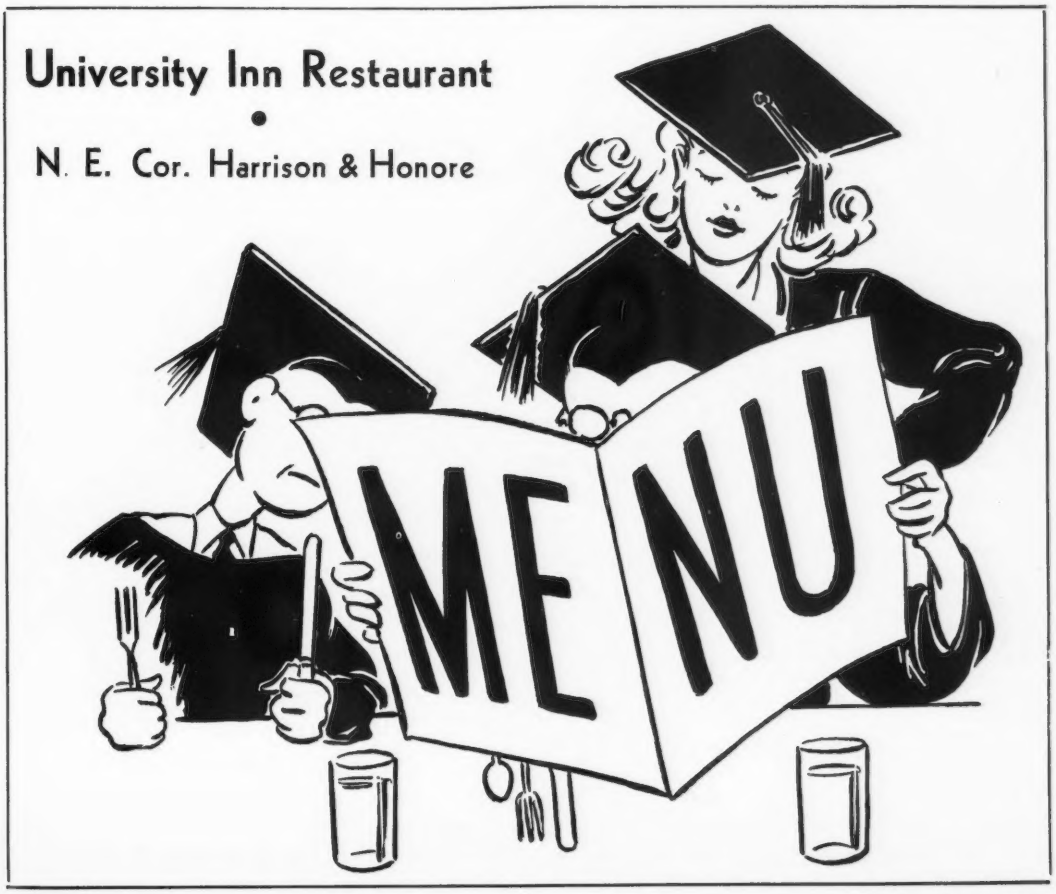
Avian tuberculosis is only exceptionally seen in man. Feldman (8), however, believes that such infections are possible, especially in young children.

In conclusion, some virus infections shall be considered. Ornithosis (psittacosis), originally a disease of free-living birds, is being found also in domestic poultry. The symptoms and the pathology of this disease are too well known to be repeated here. Of the other viruses, those of encephalitis are often carried by birds which do not show pathologic changes when infected with these microorganisms. Farm fowl may transfer the infection to other animals, especially horses, and to man, or to carrier insects (9). While contact infections of man were frequently observed, it has not been proven as yet that man can acquire ornithosis or virus encephalitis by eating infected poultry.

Summarizing our discussion, we see that a number of important human diseases are carried by poultry and that it is necessary to direct increasing attention to fowl as a possible source of man's disease.

REFERENCES

1. Brandly, P. J.: J. A. Vet. A., *122* : 10, 1948.
2. Edwards, P. R. and Bruner, D. W.: J. Inf. Dis., *72* : 58, 1943.
3. Hinshaw, W. R., McNeil, E. and Taylor, T. J.: Am. J. Hyg., *40* : 264, 1944.
4. Felsenfeld, O., Gonzalez, L. M. and Young, V. M. : Puerto Rico J. Publ. Health & Trop. M., *24* : 9, 1948.
5. Edwards, P. R., Bruner, D. W. and Moran, A. B. : J. Inf. Dis., *83* : 220, 1948.
6. Felsenfeld, O. and Young, V. M. : Am. J. Trop. Med., in print.
7. Felsenfeld, O. : Poultry Sic., *28* : 142, 1948.
8. Feldman, W. H. : Avian Tuberculosis Infections. Williams & Wilkins, 1938, and personal communications.
9. Hammon, W. McD., Reeves, W. C., Bonner, S. R. and Brookman, B. : J.A.M.A., *128* : 1133, 1945.



A.I.M.S. CONVENTION

THE Association of Internes and Medical Students held their annual convention in Philadelphia, Dec. 27-29, 1948. The Chicago Medical School Chapter was represented by three delegates, Dave Schulman '52, Jesse Schessel '51, Alfred Moldovan '50.

The Convention provided an extensive scientific program which gave the delegates a wonderful opportunity to hear some of the leading medical research workers discuss the latest developments in their respective fields.

Aside from attending the seminars and lectures, the delegates formulated a program to carry out the ideals and aims of the organization. This program was formulated in open discussion and with full participation of all delegates.

Much of the program adopted was a reaffirmation of the previous position of the AIMS in the fields of Medical Education and Student Welfare, Interne Education and Welfare, International Activities, Discrimination in Medicine and Academic Freedom and Civil Liberties.

An important step however, was taken in the passage of a resolution supporting, ". . . a prepaid, national, government sponsored health program, universal . . . its application and financed by means of contributions based on the individual's ability to pay". Also endorsed in principle was the broad approach to the problem of a national health program as outlined in Federal Securities Administration, Oscar Ewing's report on "The Nation's Health".

This reslution has been referred to the chapters for ratification by a referendum of all members. The referendum following full and adequate discussion of the resolution and all pertinent data relating to it. The Chicago Medical School Chapter has begun a series of lectures by faculty members and other interested individuals, to provide the necessary educational background for a proper understanding of Health Legislation. The first such lecture was delivered by Dr. Irving S. Neiman to an overflow crowd of students. Other lectures and discussions will follow. A mailed ballot to each member will then determine the Chapter's attitude on the resolution of the convention.

Of grave concern to the convention was the resolution passed by the AMA, alleging certain attitudes and actions to the AIMS, and instructing its Council on Medical Education to conduct an investigation of the AIMS. To answer this attack the convention adopted a resolution unequivocally denying the allegations and reaffirmed that AIMS stood for ". . . a development and improvement of medical education and practice—an open and democratic fashion, and has always offered free access to its princples, policies and actions to all interested groups". The convention also ". . . calls on the medical profession to consider objectively the facts involved and the allegations made . . ."

Much interest was evoked by the reports made by the various students who had traveled through Europe with the help of AIMS. Last summer, 56 medical students and Internes traveled through nearly every country in Europe. Clinical Clerkships were made available to students in Norway and other countries, an International Clinical Congress was held in England. A more expanded program of travel was projected for the coming summer. It was felt that many students would want to avail themselves of the opportunity to travel in Europe to meet students of other countries and to exchange ideas and information.

In recognition of the large AIMS membership in the Chicago area and the great activity by the mid-western members, the Secretariat of AIMS, including the Executive Sec., Student Sec., and Nat'l. Publicity Director, were elected from the Chicago area. Alfred Moldovan of Chicago Medical School was elected as Nat'l. Publicity Director.

Since the convention, The Chicago Medical School Chapter has undertaken many activities which will be reported as they achieve fruition. An educational program on Health Legislation, plans to send medical supplies to Europe, a program to combat anti-vivisection and other valuable projects are being developed.

At the last business meeting held by the chapter, the following were elected:

Pres.—Lester Wishingrad '51
Vice Pres.—Morton Shaw '50
Corresponding Sec.—Dave Schulman '52
Membership Sec.—Jesse Schessel '51

The membership in AMS at The Chicago Medical School is over 110 members, making it the largest chapter in the country.

Book Review

BLOOD TRANSFUSION. By Elmer L. DeGowin, M.D., Robert C. Hardin, M.D., and John B. Alsever, M.D. Cloth. Pp. 587, illustrated with two hundred diagrammatic drawings. W. B. Saunders Co., Philadelphia and London, 1949.

(Review by Jeorme Litt)

Since the first blood bank in the United States was established in 1937, there has been a great increase in the therapeutic use of blood and its derivatives and, consequently, a steady growth in the number of blood banks. Transfusion services have been developed by the trial-and-error method by their founders. Much of the hard-earned experience obtained in this manner has not been formally recorded, but has been passed on by word of mouth or in personal correspondence. This state of affairs was brought into sharp focus during World War II when the Federal Government encouraged the establishment of civilian blood banks as a measure for national defense. At that time there was no single publication which dealt adequately with the problems of organizing and operating a blood transfusion service. To fill this need during World War II, a number of technical manuals and pamphlets on the subject were published. They were revised and subsequently extended but they still contained many inadequacies. It is only recently that the material on this subject has manifested itself in journals and at conferences, and a new text on blood transfusion is, indeed, a great step forward in the dissemination of the knowledge and the practical application of so vital a topic.

In this work, the authors have chosen to cover the entire field of blood transfusion rather than to limit its scope to a consideration of either whole blood or plasma. A major portion of the text has been devoted to the various aspects of whole blood transfusion because the authors, as clinicians, feel that whole blood is still, and will continue to be, the major need in the treatment of patients. In addition, the management of whole blood transfusions is a more intricate subject than is the processing and administration of plasma or its derivatives.

The text includes material which is of interest to (1) physicians and medical students whose patients receive transfusions, (2) physicians and others who supervise transfusion services, and (3) laboratory technicians who perform the tests and procedures necessary in modern transfusion. For the convenience of the latter group, the step-by-step description of laboratory tests has been segregated in a separate section.

As for references, the writers have cited only those articles which they have read and considered important in the light of their experience, and the writers clearly indicate — firmly, yet not dogmatically — their judgment and opinions on many of the subjects.

This book will unquestionably render invaluable service to those who are actively interested in the subject of blood transfusion, and to the many physicians, residents, and internes it clearly brings home the fact that blood transfusions cannot and should not be carried out as simply as "in the good old days."

School And Faculty Notes

BOARD OF TRUSTEES

The Board of Trustees, Faculty, Alumni, and Students all note with regret the resignation of Dr. U. G. Darling, which was presented at the March meeting of the Board. Dr. Darling first came to The Chicago Medical School in 1930 as professor and Chairman of the Department of Psychiatry and Neurology. He served in that capacity until 1936 when he was retired as Professor Emeritus in Psychiatry. Dr. Darling has served on the Board of Trustees and has taken a very active interest in all the problems which faced the school during the past 19 years. The vacancy created by his resignation will be filled by Mr. Monroe Pfaelzer, a well known community worker of Chicago.

On March 9 the following was adopted by the Board of Trustees:

RESOLUTION ADOPTED BY BOARD OF TRUSTEES, MARCH 9, 1949

Whereas the Board of Trustees of The Chicago Medical School is thoroughly cognizant of the long and fruitful service which Dr. Darling rendered to The Chicago Medical School, both as Professor and as Trustee, and,

Whereas Dr. Darling's service was not only thoroughly altruistic and outstanding, but also served as a model and inspiration to others, and,

Whereas The Chicago Medical School greatly benefitted from his services and efforts through many long and arduous years,

Be it resolved that the Board of Trustees of The Chicago Medical School herewith expresses its best wishes for his continued good health and happiness.

And be it further resolved that the foregoing resolution be spread in the Minutes of the Board of Trustees of The Chicago Medical School.

* * * * *

OFFICE OF THE DEAN

Dr. John J. Sheinin presided at the afternoon Clinical Conference of The Chicago Medical Society on March 4, 1949 during its annual session at the Palmer House.

On April 26, 1949 Dr. Sheinin was invited to attend a Dinner-Conference at the LaSalle Hotel in Chicago. The dinner was sponsored by the Illinois State Medical Society for some 70 interns and residents who plan to practice downstate. Some of the problems facing a physician who wishes to practice in Illinois were discussed.

On May 3, Dr. Sheinin joined the Deans of the other four medical schools in the city at the Edgewater Beach Hotel, acting as judges of a contest to encourage interns and residents to write scientific papers. The contest was sponsored by the North Shore Branch of The Chicago Medical Society.

On May 5, Dr. Sheinin was invited to address The Premedical Club at Wilson Junior College. The topic chosen was, "Factors Considered in the Selection of Medical Students."

ALUMNI

Dr. Abe Schwartz is now completing his residency in psychiatry at Brentwood Hospital (a VA hospital) in West Los Angeles, Calif.

Crawford-Madison X-Ray Lab.

The Crawford-Madison X-ray Laboratory located at 7 So. Pulaski Road is now under new management. The new owner is August Linders, a competent and efficient technician of top quality. He graduated from an accredited X-ray technician school in 1940 and since then has spent 5 years in charge of the X-ray laboratory of a private clinic, 2 years in the Army Air Force, and following discharge served as an X-ray technician at the Illinois Children's School Hospital.

He maintains COMPLETE X-RAY SERVICE both medical and dental and is willing and able to supply all needs of the practitioner. Diagnostic interpretations may be had at no extra cost by a competent physician, if desired.

(See advertisement on page 3)

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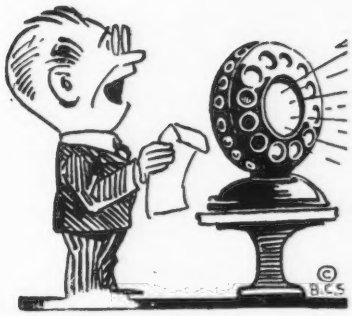

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